METHODS
F TEACHING IN
IGH SCHOOLS

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BOOKS ON EDUCATION

BY

SAMUEL CHESTER PARKER

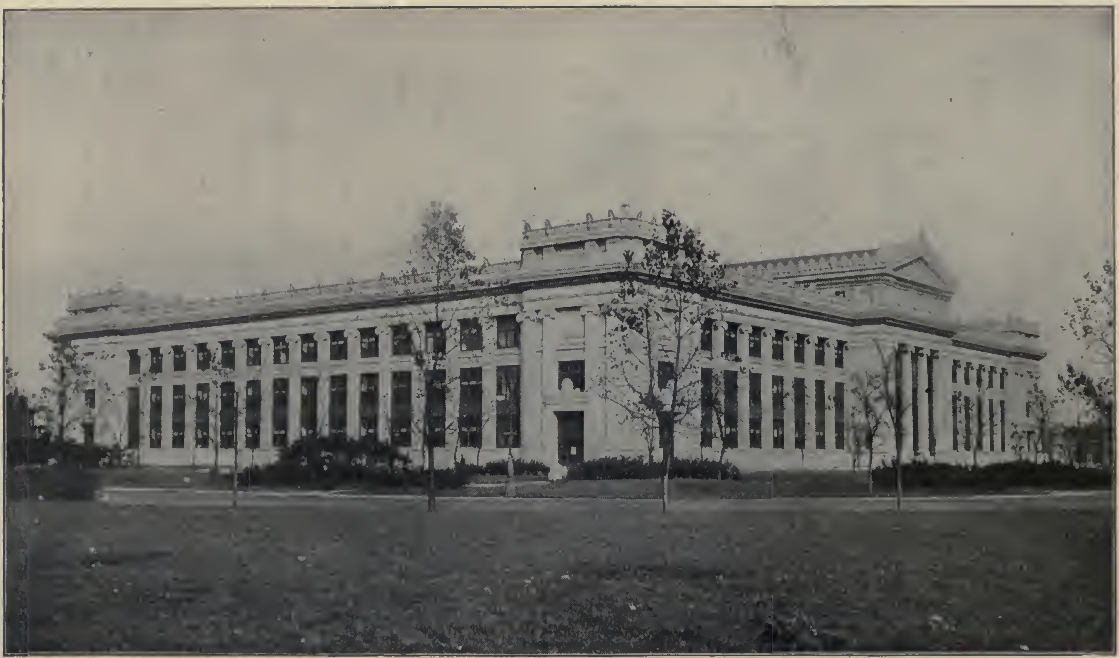
Professor of Educational Methods in
The University of Chicago

The History of Modern Elementary Education
8vo, 505 pages

Methods of Teaching in High Schools
8vo, 529 pages

Exercises for "Methods of Teaching in High Schools"
8vo, 261 pages

General Methods of Teaching in Elementary Schools
8vo, 332 pages



HARRISON TECHNICAL HIGH SCHOOL, CHICAGO, ILLINOIS

Compare the picture on page 4

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METHODS OF TEACHING IN HIGH SCHOOLS

BY

SAMUEL CHESTER PARKER

PROFESSOR OF EDUCATIONAL METHODS IN
THE UNIVERSITY OF CHICAGO

REVISED EDITION

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AND TO HIS ASSOCIATES IN THE
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PREFACE

This textbook applies to high-school instruction the same general principles that have been applied so frequently and fruitfully to the consideration of elementary-school methods. It contains some of the materials used by the author in his classes in educational methods for prospective high-school teachers. Sometimes his classes contain both prospective elementary and high-school teachers. At such times, after a general principle of method has been discussed, applications are made to both elementary and high-school teaching, because practically every general principle of method does apply in both places. Inasmuch as the line between elementary and secondary (or adolescent) education should probably be drawn at about twelve or thirteen years of age, the illustrations given in this volume will apply in many cases to the seventh and eighth grades as well. It is the intention to issue a companion volume which will follow the same general lines as this one, but will draw its illustrations from the elementary grades proper; namely, from the kindergarten through the sixth grade.

The scientific basis for part of the discussion in the book is found in modern experimental psychology. This is particularly the case in the discussion of certain aspects of learning which have been subjected to extensive laboratory investigation, such as motor learning and practice. In other cases, where experimental data are not available, I have relied on authoritative, analytical discussions such as Professor Dewey's "How We Think."

The author's general point of view has been determined by a number of influences. The first factor was four years' experience as a pupil and one as a teacher in the Technical School of Cincinnati, a private manual-training high school which exemplified in its instruction the efficient and progressive application of many of the most important principles of method. The second factor was a year's training in general and experimental psychology and education under Professor C. H. Judd. The third set of influences included studies under Professors John Dewey and E. L. Thorndike of Columbia University. The latter's textbook, entitled "Principles of Teaching" (1905), has been especially influential, since I have used it as a basis of discussion in my classes for nine years. The final factor in determining the preparation of this textbook was the opportunity given me to teach the courses in the subdivision of Educational Methods in the Department of Education at The University of Chicago. It is the function of this subdivision of the department to discuss and investigate problems of method or classroom procedure at all stages of schooling.

In general the author takes the point of view that efficiency and economy in instruction are facilitated by (1) radically adapting all instruction to contemporary social needs, (2) basing methods of instruction on sound psychological principles which have been determined, as far as possible, experimentally, and (3) applying principles of scientific business management to the conduct of all teaching. The first of these standards eliminates processes that have no direct social value; the second eliminates waste of effort resulting from the use of uneconomical and ineffective methods of learning; the third eliminates waste of time which results from failure to standardize materials and processes.

In order that this volume may serve to introduce students to the great body of practical educational literature that is now available, and may initiate habits of consulting such material, especially as it appears in current periodicals, I have quoted, wherever possible, from worthy discussions of the topics under consideration and have suggested that the students follow up the topics more fully in the sources that I have used.

I am indebted to a number of my colleagues in The University of Chicago for suggestions and criticisms. Of these, Professors J. F. Bobbitt, F. N. Freeman, R. L. Lyman, and Mr. W. S. Gray read and criticized certain chapters or parts of chapters; Professor Harvey Carr made a number of suggestions in connection with the discussion of learning processes; and Mr. A. F. Barnard, Mr. E. R. Breslich, and Miss Lydia Schmidt, of the University High School, have contributed a number of practical examples. For permission to reproduce illustrations from various sources I am indebted to a number of authors and publishers whose names are noted in the list of illustrations and in the body of the text.

EXERCISES FOR "METHODS OF TEACHING IN HIGH SCHOOLS"

A problem-solving method in a social science. — A volume of supplementary material is issued under the above title for use in college and university classes that have the "Methods of Teaching in High Schools" as a textbook. This supplementary volume contains a complete scheme of assignments and problems for class discussion which have been developed in the author's classes in The University of Chicago. Thus it is an example of the recent movement to organize problem-solving methods in the social sciences, of which education is one. The problems give the students practice in interpreting the discussions of the text and in actually applying these to the solution of real problems of teaching.

New source material, readings, and bibliographies. — Since many of the exercises contain new source material, such as lesson plans, language lessons for teaching English to foreigners, poems, lists of readings of high-school pupils, pictures, cartoons, etc., the volume also serves as a book of sources and supplementary readings. The bibliographies have been enriched by the addition of recent publications.

Assignments for term papers, outlines, summaries, and directions for study. — Another element in the "Exercises" is found in the detailed assignments for three term papers based on (1) an analysis of recent high-school textbooks, (2) recent practical articles in educational magazines, and (3) each student's own efforts to apply the course to his own specific problems as a teacher. Finally, outlines, summaries, and directions for study are distributed through the book to aid students in securing a coherent grasp of the problems of teaching in high school.

Mimeographed aids. — Supplementary mimeographed aids for teaching the "Methods" and "Exercises" are constantly being tested out in the author's classes at The University of Chicago. He will be glad to send sample copies of these to any instructor who desires them.

PREFACE TO THE REVISED EDITION

The printing of a new edition of the "Methods of Teaching in High Schools" has given the author an opportunity to make a number of slight but important revisions. Some of these are necessitated by new scientific investigations, while others are merely improvements in the examples or the phrasing. References have also been inserted to the supplementary volume, "Exercises for 'Methods of Teaching in High Schools,'" which will assist instructors and students in using both books. With the abundant new material in the "Exercises" and the changes in the "Methods," the texts give the reader the benefit of the most recent discoveries and discussions in the field of methods of teaching in high schools. The fundamental organization, however, has nowhere been changed, hence instructors who have become accustomed to teaching the "Methods" and "Exercises" may continue to use the same coherent outline which these have provided. The instructor who is interested in noting important changes may compare the following pages in the new and old editions: 130, an improved Gouin series; 155–158, memorizing by parts; 178, civic problems; 212, 217, 225, 226, steps in acquiring abstract ideas; 347, value of emulation; 391, 400, 402, supervised study for *poor* pupils; 517, observation directions.

In the author's "General Methods of Teaching in Elementary Schools" (Ginn and Company, 1919) a number of the general topics of the present text are treated with special reference to elementary-school teaching. In some of the chapters of the "General Methods," notably those on broadening purposes and individual differences, certain *general* matters have been treated in fuller detail than in the present text and additional facts presented which relate equally to elementary and high-school teaching.

Recent discussions by the Society of College Teachers of Education suggest the strong desirability of requiring of college juniors or seniors who expect to teach in high schools a distinct course dealing with the methods of classroom instruction as distinguished from the more general historical and administrative problems dealt with in the older omnibus courses in secondary education. For several years it has been our conviction in The University of Chicago that such practical discussions of classroom methods outweigh in importance and practical value for prospective high-school teachers the more general omnibus discussions. Hence it has been our practice to require of such teachers the course in Methods of Teaching in High Schools and to permit them to elect, if they so desire, other courses dealing with the history, psychology, and administration of secondary education.

S. C. PARKER

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Four types of laboratory notebooks. Reproduced by permission from the *School Review* 451–453

SUPPLEMENTARY READING

In periodicals. — All prospective high-school teachers should form the habit of reading regularly the educational periodicals which deal with general problems of high-school instruction or with the teaching of special subjects in high school. These periodicals are full of practical suggestions and put the reader in touch with the most progressive methods of teaching. Students should be required to prepare select bibliographies of articles dealing with the teaching of special subjects in which they are interested and to present oral or written reports on a few of the articles.

The following periodicals are especially helpful:

1. *The School Review.* Published by The University of Chicago School of Education. The best journal devoted to general problems of high-school organization and instruction.

2. *The English Journal.* Published by The University of Chicago Press.

3. *The History Teachers' Magazine.* Published by the McKinley Publishing Co., Philadelphia, Pennsylvania.

4. *School Science and Mathematics.* Published by Smith and Turton, Mount Morris, Illinois.

For other journals of less general interest than those named above, plus an assignment of a report to be based on practical reading in such periodicals, see "Exercises for 'Methods of Teaching in High Schools,'" p. E71.

KEY TO BIBLIOGRAPHICAL REFERENCES

The books from which quotations are made in the text are included in the bibliographies which are printed at the ends of the chapters. The source of each quotation is indicated (usually at its end) by two figures in parenthesis. The first figure refers to the book by its number in the bibliography at the end of the chapter, and the second figure refers to the page. Thus, (**4** : 76) means page 76 in the fourth book in the chapter bibliography. This system has been adopted in order that the instructor or student may verify or follow up any quotation, but at the same time the ordinary reader will not be distracted by numerous footnote references which are unimportant in his reading.

METHODS OF TEACHING IN HIGH SCHOOLS

METHODS OF TEACHING IN HIGH SCHOOLS

CHAPTER I

INTRODUCTION — SCOPE OF THE BOOK

Purpose. — The purpose of this textbook is to introduce students to a study of the principles which underlie instruction in high-school subjects. Hence it is concerned primarily with the work of classroom teachers and only incidentally with the curriculum and organization of high schools.

Possibility of applying general principles to high-school instruction. — The principles which underlie methods of teaching have been discussed very thoroughly in many excellent books from the standpoint of *elementary* schools, but there have been relatively few books which have performed the same service for *high-school* methods in general. A similar contrast exists between the large number of books dealing with high-school *organization* and the small number dealing with high-school *methods* in general.

This situation is partially due to the fact that the methods of teaching in high schools may vary greatly with the nature of the subjects taught. Striking examples of this variation are found in the problems of method involved in teaching manual training, a foreign language, and geometry. Each of these subjects has peculiar problems of method different from those in the other subjects. In the case of many high-school subjects there is no lack of discussion of these *special* methods. Thus we have numerous books dealing with the teaching of English, history, mathematics, and the sciences in high schools, but few discussions of *general* methods of high-school instruction.

Moreover, it has been generally assumed that all that a high-school teacher needs in order to be successful is a thorough knowledge of his subject matter plus the ability to make pupils behave. Persons who have held this point of view have often been willing to admit that a knowledge of the principles of method may improve the work of teachers in kindergartens and in elementary schools, but they have held that such pedagogical considerations could contribute little to the improvement of high-school teaching.

There are, however, many phases of high-school teaching in which general principles of method play as important a part as they do in elementary school work. In the chapters that follow, an endeavor will be made to demonstrate this fact in detail.

Main topics to be discussed. — The principal topics which will be taken up are the following:

1. The purposes to be attained by high-school instruction.
2. The importance of economy in classroom activity; the attaining of a given purpose with the minimum of time and energy.
3. Standards determining the selection and arrangement of subject matter within a given subject; that is, what to teach and how to organize it.
4. The most economical and effective methods of learning to be employed in different subjects.
5. How to stimulate pupils to learn most economically, that is, with effective concentration of energy.
6. Provisions for individual differences in class instruction, so that each pupil may advance at a pace suited to his capacities.
7. Supervision of study to eliminate misdirected effort.

8. The most effective use of various sources for enriching pupils' experiences, involving a consideration of

(*a*) Books as sources; recitation and reference methods.

(*b*) The pupils' own objective experiences, both present and past, as sources; laboratory and conversational methods.

9. The planning of instruction to assure that definite and valuable experiences are to be provided.

10. The testing of teaching, as a check to determine how effectively the purposes have been attained.

11. The observation of teaching, to show the practical applications of educational theory.

Principles based on scientific evidence and expert opinion. — In the discussions which follow, it will be possible in some cases to present well-established scientific conclusions as the theoretical basis of the principles under consideration, and to indicate how the latter have been carried out in successful practice in typical high schools. In other cases, however, there may be no stronger evidence in favor of the principles advocated than the opinions of some of the best-informed thinkers about education who have written since the time of John Locke (1632–1704). These opinions may not be valid, but the chances are that they are nearer the truth than the opinions of persons who have not devoted considerable study to pedagogical problems. In any case, they serve the purpose of introducing the student to the problems, and prepare him to appreciate and perhaps contribute to the more valid *experimental* determination of the best methods of instruction, which promises to play such a large part in future educational endeavor.

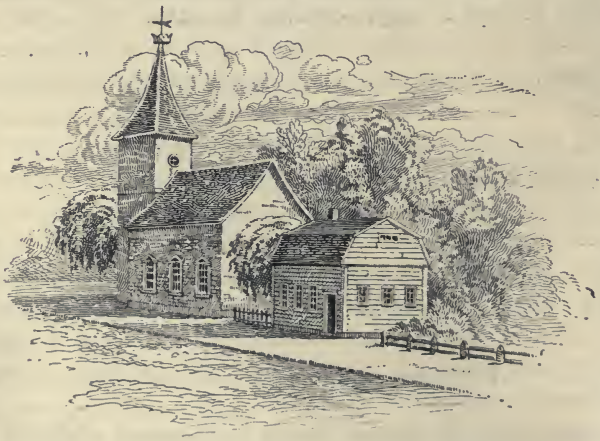
Observations of classes should supplement study of the text. — In order to relate the discussions in each chapter to practical situations, instructors who are using the text and have facilities for observation should utilize the directions given in Chapter XXIII. Observations should be required early in the course, in order to furnish students with fresh concrete examples of the general principles under discussion. The suggestions provided by the author may be modified to suit local needs, but in every case it is desirable to provide the observers with definite questions or points upon which observations and subsequent discussions may be based.

BIBLIOGRAPHICAL NOTE

PARKER, S. C. *The Present Status of Education as a Science in the Field of Methods.* School Review Monograph No. II. (University of Chicago Press, 1912.) Pp. 135–150.

EXERCISES

For problems for class discussion of Chapter I, see *Exercises for "Methods of Teaching in High Schools,"* pp. E10–E13.



THE BOSTON LATIN GRAMMAR SCHOOL, FOUNDED 1635

From Monroe's "History of Education." The contrast between this simple building in the yard of King's Chapel and the magnificent Chicago high school shown in the frontispiece is paralleled by a similar contrast in the aims and curricula of the secondary schools of the seventeenth and twentieth centuries

CHAPTER II

BROADENING PURPOSES OF HIGH-SCHOOL INSTRUCTION

To the student. — At the beginning of each chapter will be found a brief statement of its main points. This should be read in order to get a general notion of what is to come, but need not be learned until the chapter is finished, when it may be studied as a summary of the chapter. The pedagogical value of reading these summaries is stated in the quotation from Herbart on page 307 of this text.

Main points of the chapter. — 1. It is important that high-school teachers should have a clear understanding of high-school purposes, in order to be able to plan their instruction to best advantage.

2. Historically, secondary schools have changed from institutions for a few select students to institutions that train many types of boys and girls for many vocations.

3. Along with the broadening of the vocational training provided in high schools has come a broadening of the conception of a liberal education to include a sympathetic understanding of contemporary civilization.

4. The broad, ultimate aims of high-school instruction include social efficiency (economic, domestic, and civic), good will, and the harmless enjoyment of leisure time.

5. The more detailed or immediate aims of instruction include health, information, habits, ideals, and abiding interests.

Necessary for teachers to appreciate purposes of instruction. — One of the most striking developments in recent educational history is the rapid change that has taken place in the prevailing conceptions of the purposes of high-school education. This change of conception affects not only the curriculum and organization of the high school, but it affects also very vitally the individual teacher in the teaching of his particular subject. If the purposes of the whole institution are modified, it follows naturally that the purposes and methods within the individual subjects must often be modified accordingly. The importance of this fact is not always realized by teachers and administrators, with the result that many maladjustments arise.

Poor adjustments result from different purposes of administrators and teachers. — For example, an administrative officer may try to reform a system of schools, or a single school, without first gradually and carefully initiating the teachers into the spirit and purpose of the reforms. As a consequence the teachers go on in their old ways or strive more or less blindly and ineffectually to readjust themselves. The resulting strain and stress commonly bring about numerous resignations, sometimes including that of the administrator who has tried to institute the reforms. A most striking example of such a situation occurred in one of our American systems toward the end of the nineteenth century. An administrator who failed to put through his reforms because of failure to get his purposes understood was succeeded by a man who had the same purposes but who started to put them into effect by a gradual and careful education of the other workers in the system into an understanding of his ideas. His efforts were characterized by complete success, in striking contrast with the failure of his predecessor.

Extreme differences of opinion exist concerning high-school purposes. — A high-school teacher going into a new situation would do well to inform himself concerning the conceptions of purpose which prevail in the situation in question. Owing to the rapid change that has been taking place, there exist at the present time the most radical differences of opinion concerning purposes. These extreme differences are sometimes found between high schools within the same city,[1] and commonly center in the antithesis between *cultural* and *vocational* purposes, or in the antithesis between *aristocratic* and *democratic* purposes. In order to provide a better understanding of these disagreements, we shall consider briefly the historical evolution of secondary schools, of which our present type of high school is the most recent development.

Suggestions from historical development of high-school purposes. — *Aristocratic or selective purpose in Latin grammar schools (1500–1750).* — The fact that the secondary schools were originally selective and hence more or less aristocratic in purpose is well illustrated from the writings of Martin Luther (1483–1546), who, in the sixteenth century, was active in stimulating the organization of both elementary and secondary schools. The selective purpose of the latter as schools to train leaders is well set forth in the following quotation:

> I hold it to be incumbent on those in authority to command their subjects to keep their children at school; for it is, beyond doubt, their duty to ensure the permanence of the above-named offices and positions, so that preachers, jurists, curates, scribes, physicians, schoolmasters, and the like may not fail from among us; for we cannot do without them. . . . Wherefore, let magistrates lay these things to heart, and let them keep a vigilant lookout; and, wherever they see a promising lad, have him pledged at school.

The elementary school was to be for all children, according to Luther, but it was the "promising lads" with whom the secondary school was to be chiefly concerned. In England and America these secondary schools were known as Latin grammar schools.

Practical value of grammar schools decreased with decline of Latin. — Though the curriculum of the Latin grammar schools included practically only instruction in Latin and sometimes Greek, they were not originally so limited in the practical value of the training they afforded as they came to be after the seventeenth century; for down to the time of Queen Elizabeth (1558–1603) Latin was used as a practical instrument in reading, studying, and social intercourse by nearly all educated people. After the seventeenth century, however, the modern languages very largely replaced the Latin for general purposes, and the latter remained of practical value for only a few select classes, including professors, ministers, lawyers, and physicians. Hence the Latin grammar school became even more narrowly selective and aristocratic in character than before. Speaking of this situation in the American colonies, and of the persistence of aristocratic traditions, Brown writes as follows in his work on "The Making of Our Middle Schools":

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[1] See the *School Review*, November, 1911, Vol. XIX, pp. 585–595, and October, 1912, Vol. XX, pp. 559–563, for a discussion between two New York City high schools.

> In this state of society, no public secondary school seems to have been even thought of for the great body of citizens — the middle or lower-middle class. It was thought desirable that all should know how to read. And a college training was needed by members of the directive class. The secondary school [however] was not a mean between these extremes, but rather an institution subsidiary to the college; that is, a preparatory school in the narrower sense. Promising youth, whatever their social station, were encouraged to go to school. But their education was a preparation for a place in an upper, that is, a ruling or at least a directing, class. (**5**: 108)

Academies organized to meet democratic and economic needs (1750–1840). — As the Latin grammar school became more and more remote from the needs of practical life, and as democratic conditions and new economic needs grew apace in the American colonies during the eighteenth century, there developed a demand for a type of secondary school that would provide training for various practical pursuits. The outcome was the establishment of the academies, the best early example being Benjamin Franklin's Academy, opened in Philadelphia in 1751. By the end of the eighteenth century these institutions were very numerous. While they commonly taught Latin, they also provided instruction in English, arithmetic, geometry, astronomy, geography, surveying, and other subjects. They were quite flexible in their organization, permitting students to enroll and study with considerable freedom. In many cases they received public support. Although the college-preparatory course was the backbone of most of them, they did not fail to provide in a very large measure for a practical type of higher education which the democracy needed.

Increased democratic needs met by public high schools (1821). — During the second quarter of the nineteenth century, however, the need for more public institutions to meet the general demands for practical secondary education resulted in the establishment of what we now know as high schools, although they were often called free academies when first established. The first of these schools was opened in Boston in 1821 and took the name *English High School* in 1824. Its purposes as providing an extension upwards of the work of the English grammar grades and as a public counterpart of certain aspects of the private academy are suggested in the following quotation from the report of the Boston school committee of 1821:

> The mode of education now adopted and the branches of knowledge that are taught at our English grammar schools are not sufficiently extensive nor otherwise calculated to bring the powers of the mind into operation nor to qualify a youth to fill usefully and respectably many of those stations, both public and private, in which he may be placed. A parent who wishes to give a child an education that shall fit him for active life, and shall serve as a foundation for eminence in his profession, whether Mercantile or Mechanical, is under the necessity of giving him a different education from any which our public schools now furnish.

Hence many children are separated from their parents and sent to private academies in this vicinity to acquire that instruction which cannot be obtained at the public seminaries. (**5** : 299–300)

Practical purposes later subordinated to training for college entrance. — Similar quotations from the records concerning other early high schools indicate the same general characteristics; that is, they provided an extension upward of the general work of the elementary school. They were not essentially college-preparatory schools, but were planned to give training for those who would go directly into "Mercantile or Mechanical" pursuits. This direct and practical aim became subordinated later to the college-preparatory aim which has dominated the high schools until recently.

Recent recognition of needs of pupils not going to college. — In the last few years there has developed a strong tendency among high-school administrators to formulate aims and organize courses of study in high schools for the large numbers of students who do not expect to go on to college. So strong has this movement become that at least one of the leading universities of the country, in recognition of the reasonableness of this policy, has so changed its entrance requirements as to permit practically any high-grade graduate of any well-organized and well-conducted high school to enter its freshman class.

It will probably be only a matter of a few years before public high schools, at least in the large towns and cities and in the more prosperous rural districts, will be considered as schools to which students go primarily for the same reason as they go to the elementary schools, namely, to secure training that will prepare them directly for more effective participation in the life of the communities in which they live.

Commissioner of Education anticipates high-school education for all. — This tendency is discussed in the following news letter issued by the United States Bureau of Education in 1912:

> The American High School has grown phenomenally in the past dozen years, its development in the last two or three years being apparently greater than in the remarkable decade just preceding. Since the twentieth century opened, the number of public high schools has almost doubled, and the number of students is easily twice what it was at the beginning of the century. The most cheering feature of the whole matter for the American citizen is the very great increase in the proportion of those who go from the grades into the high school. Formerly (only a very few years ago, in fact) the high school was chiefly attended by children of the rich and moderately well-to-do. To-day nearly one fourth of the children who enter the elementary school eventually pass into the high school. The exact figure is 22 per cent if negro children are included and 25 per cent if whites only are considered.
>
> The people have shown their appreciation of their high school in the most direct way possible — by supporting it unfailingly and generously. They have faith enough in it to pay huge sums of money year after year that the high school may do greater and greater work. More and more attention is being paid to high-school education. Million-dollar school buildings are going up in American cities — palaces, one might call them, did not the word suggest idleness, and there is no idleness in the present-day high school. Industry, technical ability, home-making, together with the essentials of a cultural education, are being taught to our boys and girls in the splendid high schools of to-day on a scale that was never dreamed of in the civic life of any nation before our time.

This statement is in striking contrast with Luther's suggestion to be on the lookout for "promising lads" for the secondary schools, and with the idea of training and selecting leaders that prevailed in the Latin grammar schools in England and in the American colonies.

Example of a high-school policy adapted to all children. — The notion of "high-school training for all children" is especially emphasized in some of the vocational and the cosmopolitan high schools. The following quotation is an extreme example taken from a report (1911) by the high-school teachers of the Washington Irving High School for Girls in New York City.

WHAT WE ARE FOR

The community sends its children to us expecting them to be educated. It raises money and pays it to us in order that the city may be uplifted. The parents who support us do not subscribe to the theory that a high school is an institution for preserving a course of study, or maintaining a system of usages, or keeping up a high standard, or training some youngsters to be leaders, or for supporting us. The people who are supporting us care little for these things. They do care for children. They pay for having the young people trained, not for maintaining a given grade of education. They send us bright, stupid, industrious, lazy, well-behaved, impudent children, not with the idea that we shall teach those that are able and willing to work, not for a decision that such a child is not fit for high school, but for having each child improved. This is not chiefly a place for those who can succeed without help. Such need us less than the others do. A public high school differs from an elementary school chiefly in the age of its children. We are not elected, we are not paid, to train leaders; . . . everyone, rich or poor, is entitled to our services. A child may be poor in brains, in effort, in appreciation, in gratitude, in respect, in all which we may have been taught to regard as high-school necessities. Such a one belongs here. Our inherited high-school theory may not accord with this. If so, the theory must disappear. Scholarship is not our chief business. Training the children we receive and securing more children to train is our business. The grade of scholarship which best trains our membership is the grade we want. This is not a fixed standard. It is one thing in 1910, another in 1911. The chairmen of departments will keep it high enough; we need not worry about that. . . .

We came into this school from many localities. Some of us studied much algebra; some, German; others, Latin. We never studied New York children. We must study them, — their previous schooling, their home surroundings, their mental characteristics, —

for the purpose of making our algebra, German, or Latin of benefit to them. We are to break away from the traditional type of a study-centered high school. We are a person-centered high school. The person is the one we are teaching. We are responsible for the success of the student. That is chiefly what we are put here for. (**10**: 585)

While certain critics may take exception to the creed set forth in this quotation, it remains in general as a significant formulation of a policy worked out by a high-school principal and his teachers to adapt the instruction in their school to the needs of all of the pupils who attend it.

Antithesis between liberal and vocational purposes. — The immediately preceding discussion was intended to bring out the contrast between the *aristocratic*, or selective, purposes which formerly prevailed in secondary education and the *democratic* purposes which are coming to prevail. The other contrast (mentioned above on page 7) is between the conception of *liberal* purposes and that of *vocational* purposes. Ordinarily it is assumed that there is some conflict between these two, and the conservative supporters of the old idea of a liberal education deprecate the tendency to introduce and emphasize studies which are related to present-day economic needs.

Progressive revision of meaning of a liberal education. — The insistence of the conservatives upon the old idea of a liberal education as necessarily a classical or literary one has led advocates of a broader secondary education to reformulate the definition of a liberal education in such a way as to justify the newer tendencies and thus to disarm the conservatives by depriving them of their chief symbol, or badge, of pretended superiority. One of the best examples of this revision is the following quotation from a paper by Professor E. P. Cubberly on the question, Does the present trend of vocational education threaten liberal culture?

Meaning of "vocational" and "liberal" is relative to the individual. — The whole question of what are liberal and what are vocational studies can be defined accurately only in terms of individuals. What is vocational for one is liberal for another. The study of chemistry, for example, which is usually classified with the technical-vocational group, and is so for the future chemist or engineer, is broadly liberal when pursued by the classical student. The same is true of geology, biology, economics, or modern industrial history. Conversely, courses in literature, world history, economics, and the life and literature of Greece or Rome would be liberal studies to the technical or the scientific student. Perhaps no greater mistake in terms is made in our educational practice to-day than to say that the high-school student who has had four years of Latin, three of Greek, four of English, two of ancient and medieval history, two of mathematics, and one year of mathematical physics has pursued a liberal-culture course of study. As a matter of fact, his course has been narrowly technical, in that it leads to but a few selected occupations; and he is in no sense liberally educated, for he knows little about the modern world in which he lives. Of the great modifying conceptions which have served to distinguish the nineteenth century he knows almost nothing, and he is ill prepared to take his place as an efficient member of the twentieth century.

Newer studies open liberal and vocational courses to more students. — To the speaker there seems very little to fear and very much to commend in the present trend toward vocational training, and he cannot see that the trend in any way seriously threatens true liberal culture. The introduction of courses in mechanic arts, commerce, agriculture, and household arts will attract to the schools great numbers who in the past have found little of interest in them, and will offer to all classes the chance to combine vocational training with a good education. To the speaker it seems indeed unfortunate, that so many young people have been and still are compelled to choose between a vocation without an education and an education without a vocation. That the introduction of these new subjects will result in a decreased percentage of our young people studying Latin and Greek is not to be denied. Indeed, it is much to be hoped. This, however, would be no blow to liberal culture. Some, of course, obtain liberal culture with such training, and for them it may be the best training possible; but, on the other hand, many do not, and for such the insistence that such studies are essential to liberal training is no longer tenable.

Modern natural and social sciences give broad outlook upon life. — If we conceive of liberal culture as coming from a study of those subjects which develop the judgment and understanding, enlarge the vision and insight, broaden the human sympathies, train for efficient living, and stimulate such intellectual ambitions as will make one interested in his life work and good company for himself, then liberal culture may come to many different individuals from the study of many different things. A conception of the theory of evolution and of a few of its applications to modern life, such as may be obtained in a study of biology; the great mind-expanding (and I might also add religion-developing) results obtainable from a study of astronomy; a fair understanding of economic laws, obtainable from a study of economics; the growing conception of world relationships, such as may be obtained from a study of commerce or industrial history; the wonderful results of modern science, as opened up by a proper study of physics and chemistry; the awakening and refining of the practical judgment of the girl, such as comes from good courses in domestic science and household economics; or a study of the life, manners, art, government, and literature of Greece or Rome, such as might be given for nonclassical students, wholly in English, and in a single year in a modern high school — any one or all of these may be liberal studies in the truest sense of the term, and the starting point of a life lived in sympathy and in increasing contact with the best in our intellectual inheritance. Such studies as I have enumerated are both liberal and vocational, according to the needs of the boy or girl who studies them.[1] (**8**: 463–465)

While this discussion of a liberal versus a vocational education, as presented by Professor Cubberly, is concerned primarily with the *curriculum* of the high school, yet the general attitude, or point of view, which it represents would affect also the work of an individual teacher within a given *subject*. Hence it is related to methods of teaching as well. This will be brought out in detail in a later chapter on the selection and arrangement of material within a given subject.

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[1] Paragraph headings not in the original.

Theoretical formulation of the broader purposes of education. — In our discussion of the broadening conceptions of the purposes of high-school instruction we have noted the practical importance of the high-school teacher's being aware of the trend of events, have traced historically the transition from the aristocratic and selective purpose to the democratic purpose, and have noted the movement to formulate a revised definition of a liberal education so as to relate it to contemporary life. As a final step in giving students an appreciation of the broader purposes which are coming to prevail, we shall discuss briefly a theoretical formulation of the aims of teaching which may have more or less practical bearing on methods of teaching. The formulation is a slight modification of that presented by Professor E. L. Thorndike in his "Principles of Teaching" (1906).

Ultimate and proximate aims outlined. — According to this formulation we may distinguish between the *ultimate* aims and the *proximate* aims of teaching. The former are the large, broad, controlling purposes; the latter include more detailed purposes which contribute to the achievement of the former but are more directly related to the daily work of the teacher. These purposes may be tabulated as follows:

Ultimate purposes

1. Social efficiency.
    a. Economic.
    b. Domestic.
    c. Civic.
2. Good will.
3. Harmless enjoyment.

Proximate purposes

1. Health.
2. Information.
3. Habits.
4. Ideals.
5. Interests.

Ultimate purposes. 1. *Efficiency in controlling affairs in a social situation.* — The first of the ultimate purposes, namely, efficiency, suggests the ability to do things effectively, to control and handle affairs, to get results, to achieve and accomplish. The qualifying term *social* suggests that the things or affairs that a person needs to be able to control or handle are nearly always parts or phases of social situations in which division of labor and other forms of relationships with people are controlling factors. The subdivision of efficiency into economic, domestic, and civic is suggested by Herbert Spencer's classification of life's activities. It is evident that most persons must be efficient in making a living, in dealing with their family affairs, and in participating in civic or political affairs.

2. *Efficiency must be directed by good will, or the endeavor to work for the common good.* — But efficiency in a social situation, or the ability to control and handle affairs, needs to be directed toward worthy ends. Hence it is necessary to provide for the second ultimate purpose, namely, good will, or the desire and endeavor to work for the common good; for a man may be extremely efficient socially, and yet direct his ability toward purely selfish ends which are opposed to the common good. Unfortunately society is always troubled with just such persons, namely, powerful social leaders who use their efficiency in controlling the affairs of the social group for corrupt purposes. The corrupt political boss is one of the best examples of this type. He may control absolutely the political affairs of a city or a county or a state for a whole generation. He is the most efficient man in the situation; it would be absurd to say that he is socially inefficient; but it is perfectly obvious that he is immoral if our standard of morality is the desire and endeavor to contribute to the common good.

3. *Efficiency supplemented by training for the harmless enjoyment of leisure time.* — But morally directed efficiency in handling affairs does not constitute all of life. The proper enjoyment of one's leisure time deserves large consideration in a scheme of education for persons that do not have to spend all of their time in a struggle for existence. Certainly for a

large part of any well-civilized community the problem presented by training for leisure is almost as pressing as the problem of training for efficiency. For example, consider the difficulties presented in this connection in such a large city as Chicago, in directing the leisure activities of boys and girls between fifteen and twenty-one years of age. Moreover, as we regard the successful effort of labor unions and publicists to get the working hours of employees reduced, it almost suggests that the reason for desiring efficiency is to secure leisure; that the latter is the final purpose toward which efficiency is directed.

Proximate aims relate ultimate aims to methods. — When we come to consider the ways in which these final, or ultimate, purposes may be achieved, we approach the problems of method, and as an intermediate step we may consider the more immediate, or proximate, purposes to be achieved, namely,

> to give boys and girls *health* in body and mind, *information* about the world of nature and men, worthy *interests* in knowledge and action, a multitude of *habits* of thought, feeling, and behavior, and *ideals* of efficiency, honor, duty, love, and service. (**3**: 3)

We shall consider briefly each of these proximate aims.

1. *Health most important but commonly neglected.* — The importance of health as an immediate aim of instruction is so generally appreciated now that if a body of college students is asked which is the most important of the five proximate aims, they will commonly answer, "Health." Yet this is not always taken into consideration in practice, as shown in the following quotation from an article entitled "College Students' Comments on their High-School Training."

> On no one point is there more unanimity than the want of attention to *bodily health and exercise;* not one has anything favorable to say on this point, and many accuse the school *in extenso* of its dereliction in physical education. [One student writes:]

> "During the first three years I do not recall a single suggestion by any teacher to get out in the open air — or anywhere else. At noon most of us stayed indoors and either strolled up and down some very dark corridors or sat at our desks and studied. The self-ventilating heating system was then in vogue, and the teachers had orders not to open the windows, so that the rooms were often stuffy and the pupils drowsy." (**11**: 651)

The individual teacher of the ordinary subjects cannot do much of a positive character to improve the health of his students. Nevertheless, he can keep their health in mind and possibly serve as a source of suggestion for activities that contribute to health. Often he would be justified in taking up, with the principal of the school, a discussion of the health of individual pupils. Certainly he should always endeavor to have the classroom and the amount and conditions of work such as not to interfere with the health of the students.

2. *Information important, but its exclusive emphasis to be avoided.* — Information is the proximate aim, or purpose, that has been most prominent in high-school instruction. This is largely due to the fact that it is very easy to devise tests, or examinations, to determine whether a student has applied himself in acquiring information, but difficult to do so in the case of certain other proximate aims, such as interests and ideals. Hence, we often find information emphasized in subjects where it should be considered relatively unimportant.

As a result of this overemphasis we often find an extreme reaction against teaching for information at all, which is just as unreasonable as the overemphasis which formerly prevailed. Extensive and exact information is an important factor in nearly all efficient social behavior where ideas play any part. In most positions there is no antithesis between knowing and efficient doing. But the other proximate aims — namely, habits, interests, and ideals — are also important factors in social behavior and should not be neglected.

3. *Special and general habits to be fixed.* — Habits, which constitute the third proximate purpose of instruction, are of two kinds, *special* and *general.* Some high-school subjects provide training primarily in the fixing of a multitude of *special* habits. For example, training in linguistic expression, either English or foreign, is largely of this sort. Skill in using language consists largely in the easy, free, habitual use of thousands of detailed forms of expression, each form corresponding to a habit. This will be brought out in greater detail in a later chapter. Other examples of such special habits are found in the motor skill involved in laboratory work. Skill in bending glass consists in a multitude of motor habits; likewise skill in making pie crust, in planing a board, etc.

Among the *general* habits mentioned by Thorndike are habits of self-control, accuracy, steady and logical thought, technical and executive habits, habits of being honorable, courageous, just, sympathetic, reverent, and modest. Thorndike himself has been most critical of the possibility of developing such general habits, but certainly, to the extent that it is possible to develop them, whether they be special or general, it is desirable to do so. Thus, it may be impossible to develop a *general* habit of accuracy, but it may be possible to develop one habit of accuracy in addition and subtraction, another habit of accuracy in verbal description, another habit of accuracy in measuring boards, another habit of accuracy in weighing substances in quantitative analysis in chemistry, another habit of accuracy in transcribing stenographic notes. Habitual accuracy is an important proximate educational aim in each of these cases.

4. *Ideals more generalized than habits.* — The development of ideals as a proximate aim of instruction is closely related to the development of habits, so far as the latter may be generalized. Thus, we aim to cultivate ideals of efficiency, honor, courage, justice, etc., as well as the corresponding habits. While there may be some question as to the extent

to which *general habits* may be cultivated, there is less doubt concerning the possibility of developing *general ideals*. To be sure, it may not be possible to have one ideal of accuracy that will be applied in all the cases cited above under habits of accuracy; for an ideal of mathematical accuracy is somewhat different from an ideal of accuracy in measurement, since the former is usually exact, while the latter is always approximate. Moreover, the degree of desirable approximate accuracy varies with the character of the measurement being made. It may be very rough in measuring boards but exact to the third decimal fraction of a very small weight in quantitative chemical analysis. Hence the carpenter's ideal of accuracy might be different from the chemist's. In spite of the specialized character of certain ideals, however, there is little doubt that there are many ideals, such as those of service, honesty, promptness, etc., which are of very wide and general application.

Ideals should involve belief and resolve, and lead to habits. — In developing ideals there are four special considerations to be kept in mind: In the first place, the proximate aim of information should not be permitted to overshadow the purpose of fixing an ideal in the student's character. For example, if history is to serve as a vehicle of ideals, the ordinary method of teaching so as to acquire encyclopedic historical information must give place to one in which selected social situations are dealt with so concretely and thoroughly as to bring out the human relationships, moral conflicts, and possible appeals to human sentiment that are involved. This suggests a second consideration, namely, that an ideal, to be of much practical value, must not exist for a student merely as an abstract formula, but must be coupled with a strong belief in its validity and with a more or less enthusiastic resolve to carry it out in practice. In the third place, students need to be led to see how manifold the applications of the ideal are — to see opportunities for carrying out, in the everyday situations in which they live, such ideals as service, honesty, and thoroughness. Finally, it is possible to provide for each of these three points and still have the ideal remain without much practical outcome in behavior. Hence it is important to see that students actually take advantage of the opportunities and are required to behave in accordance with the ideals which have been established. This leads back to the third proximate aim in instruction, namely, habits.

5. *Abiding interests to determine students' desires for further experiences.* — The fifth proximate aim of instruction — namely, the development of abiding, or permanent, interests — owes its prominence historically to the German educational reformer Herbart (1776–1841), who introduced it into one of his discussions in contrast with the *ultimate* moral purpose of education, in the following words:

> The ultimate purpose of instruction is contained in the notion, virtue. But in order to realize the final aim, another and nearer one must be set up. We may term it *many-sidedness of interest.* The word *interest* stands in general for that kind of mental activity which it is the business of instruction to incite. Mere information does not suffice, for this we think of as a supply, or store, of facts, which a person might possess or lack and still remain the same being. But he who lays hold of his information and reaches out for more takes an interest in it. Since, however, this mental activity is varied, we need to add the further determination supplied by the term *many-sidedness.*

Thus we see that with Herbart the most important proximate aim of instruction is to determine and fix in the character of the pupil the lines of interest which will occupy him in later life. This is in striking contrast with the common notion of the purposes of schooling as represented in the senior-day exercises at graduation, when the students burn their books as an indication that they are forever through with the dreary things of school, and are happy to think that never again will they have such distasteful matters to deal with.

Fortunately the studies and methods in high-school instruction are being so humanized and related to the everyday out-of-school interests of normal human beings that the possibility of determining and fixing abiding interests for pupils is greatly increased. Hence we may look forward to the day when most instruction will result in the pupils' "laying hold of and reaching out after more" of the types of experiences to which the school has introduced or habituated them.

Relation of proximate aims to methods to be determined later. — This will conclude our discussion of Thorndike's theoretical formulation of the purposes of education. While the ultimate purposes — namely, efficiency, good will, and harmless enjoyment — may seem to be somewhat abstract and to have little direct relation to methods of instruction, it should be evident by this time that the proximate aims — namely, health, information, habits, ideals, and interests — are vital factors in determining what methods of instruction shall be used in the various subjects. This will be increasingly evident in some of the detailed discussions which follow. In the next chapter we shall take up a consideration of certain general aspects of the school as a specialized institution set apart to achieve as economically as possible the purposes discussed in this chapter.

BIBLIOGRAPHICAL NOTES

General statement. — The bibliographical notes at the ends of the chapters are not intended to be at all exhaustive or complete. They are intended to provide a few references to discussions that are related directly to the topics treated in the chapters.

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EXERCISES

For problems for class discussion of Chapter II, see *Exercises for "Methods of Teaching in High Schools,"* pp. E17–E22.

For directions concerning "How to Study," see pp. E14–E16 and E23–E25.

CHAPTER III

ECONOMY IN CLASSROOM MANAGEMENT

Main points of the chapter. — 1. The school is a complicated institution with large opportunities for waste and for economy.

2. To avoid waste, principles of business management should be applied in the classroom.

3. Routine is necessary for efficiency and economizes time and energy.

4. Individuality, spontaneity, initiative, and reasoning may have the same place in a well-routinized school as they have in democratic social life.

5. The principal routine factors are (1) beginning right, (2) seating of students, (3) passing to and from recitations, (4) handling materials, (5) attention to physical conditions, (6) preserving order.

Need to correlate progressive theory and efficient practice. — In the preceding chapter we established a general point of view concerning the purposes of high-school instruction which will assist us in judging the value of processes of instruction to be discussed in later portions of the book. There is danger, however, that educational leaders and students will overemphasize the somewhat idealistic conceptions presented in the preceding chapter, and will neglect to keep in mind the practical school situation in which such theories have to be carried out. This statement does not imply that the more progressive policies cannot be carried out in actual practice, but it does imply that the success of progressive reforms will depend upon the efficiency with which reformers apply principles of business management in organizing their instruction. Consequently, in order to secure a proper balance in the mind of the reader between an enthusiasm for broader modern ideals in education, on the one hand, and principles of practical management, on the other, this chapter dealing with economy in classroom management is introduced at this point.

Teacher should avoid misdirected time and energy. — The school is a complicated, specialized institution, maintained by society to achieve certain specific results. The classroom activities should be planned carefully to make sure that they are directed toward securing these results most economically and effectively, and the possibilities of misdirected time, effort, and energy should be reduced to a minimum.

Principles of business management should be applied. — In any other institution or organization or plant which is as complicated as the school, efficiency depends to a large extent upon careful attention to the details of management. In a manufacturing plant, for example, great care is taken to provide for the most economic placing and handling of material, so as to eliminate waste motion. A manufacturer may enormously increase the efficiency of his plant by inventing a device that will require fewer operations to produce an article, or will produce several articles by the same number of operations as formerly produced but one. If such principles of economy are important in factories, where the product that is wasted or economized is material, they are much more important in the school, where the product to be wasted or economized consists of human lives. No factory deals with such precious raw material as does the school; hence in no other process is it so important to give careful attention to the problems of waste and economy as in education.

Routinize mechanical aspects; use judgment in variable aspects. — The sources of waste in classroom work have been divided by Professor Bagley into two principal types: The first type includes those where the waste is due to failure to organize properly certain mechanical aspects of the classroom activity. To this type he applies the term *routine factors*. The second type includes those sources of waste which are due to failure to adjust the classroom activities to the constantly varying capacities, interests, and responses of the students. To these aspects of school work Bagley applies the term *judgment factors*. The routine factors include those matters that recur in approximately the same form from day to day and which can be advantageously systematized, organized, and reduced to mechanical habits. The judgment factors, on the other hand, are constantly varying, and require of the teacher constant alert exercise of judgment in order to avoid misdirected time and energy.

List of principal routine and judgment factors. — The principal matters to which attention should be given from the standpoint of routine are the following:

1. Getting started right the first day.
2. Seating of students.
3. Passing to and from recitations.
4. Handling materials.
5. Attention to physical conditions.
6. Maintenance of order.

The principal judgment factors are related to making provisions for individual differences in capacities and securing concentrated attention in the right direction. This chapter will discuss the elimination of waste through proper organization of the routine factors. The judgment factors will be considered in several later chapters.

Reasoning and individuality may have the same place in a well-routinized school as in social life. — Before taking up a detailed discussion of the routine factors, we shall endeavor to justify the "business conception" of school-keeping which has been outlined above, since, according to many idealistic educators, "factory standards" and "machine processes" have no place in the school. They use these words as terms of reproach, and always speak of the "ideal school" in terms of freedom, spontaneity, initiative, reasoning, etc. Their point of departure for emphasizing the latter is a notion of democratic society in which these elements of freedom etc. have unrestrained operation. I shall endeavor to show that *freedom, spontaneity, individuality, initiative, and reasoning have the same place in a well-routinized school as they have in democratic social life.* This can be done to advantage in connection with Bagley's answers to the arguments that have been advanced against routinizing any phases of school work. (**1** : 32)

Democratic social organization often disregards individuality.—The first two objections that Bagley cites and refutes are that "mechanical organization disregards the individuality of the child" and that, since it is imposed from without, "it is an expression of arbitrary and despotic rule." The answer to this objection is that even in a democratic society social organization does the same thing as far as the individual is concerned. Society and its official representatives set definite lines within which the individual must behave. To him these lines may appear "arbitrary and despotic" and may seem to "disregard his individuality"; but he has to conform. Thus, a driver of a vehicle in the crowded streets of Chicago cannot make a crossing without the permission of the traffic policeman. Doubtless he would often prefer to dash ahead, after the policeman has blown his whistle to stop traffic in his direction. Doubtless it appears "arbitrary and despotic" when the policeman makes him take a long turn in going around a corner, instead of "short-cutting" across. But the traffic regulations, personified in the traffic policeman, are great social time-savers. When, as an experiment, the policemen were removed for a few minutes one day in the congested down-town district, it required only a short time for all traffic to come to a standstill, because the "individuality" of the drivers, chauffeurs, and motormen was given full sway and the "despotic rule" of the social guardians abolished.

Efficient spontaneity may be encouraged by routine responsibilities. — Another objection which is advanced against providing for routine in school work is that it "discourages spontaneous effort." If this be true, it is just as true of democratic social life as it is of the school. In our own modern democratic life all activities are organized and nearly every person operates as part of some organization, whether it be the government, or a business house, or simply a family. As a rule, the individual who is working in an organization has certain lines prescribed for him, within which he may be as "intelligently spontaneous" as he is capable of being. The buyer for a department in a large business concern or the head of a government office has certain definite routine responsibilities, but it is doubtful whether this interferes with his efficient spontaneity in perfecting his own work. The testimony of many persons would indicate just the opposite, namely, that definitely fixed routine responsibilities may act as stimuli to spontaneous effort instead of acting as deterrents.

Routine does not necessarily eliminate rational methods. — Another objection that is sometimes urged against routinizing any school activities is that "mechanical organization in matters properly routine tends to spread to matters of a different nature." Unfortunately this is true in the case of many teachers and administrators. It is to be regretted that there are many educational extremists who tend to line up in either one of the following columns.

Extreme formalists	*Extreme idealists*
1. All routine, no freedom.	1. All freedom, no routine.
2. Emphasize formal subjects, neglect content subjects.	2. Emphasize content subjects, neglect formal subjects.
3. Emphasize memorizing, neglect reasoning.	3. Emphasize reasoning, neglect memorizing.

But it is not necessary to be either an extreme formalist or an extreme idealist. It is possible to provide for an adequate study of the content subjects by methods that involve reasoning, and at the same time to provide for routinizing those phases of classroom management in which it will result in economy of time and effort.

Habits free the mind for reasoning. — The point just mentioned is related to a final objection, namely, that "routine, or habit, antagonizes reason." By habit we mean the tendency to behave in situations in approximately the same ways as we have behaved in similar situations before. By reasoning we mean the tendency to reflect concerning readjusting or modifying our reactions to situations — to think out new methods of dealing with problematic situations.

The tendency to focus attention on either one or the other of these two phases of behavior, namely, habit and reasoning, is brought out in an interesting way in comparing two definitions of education, one by William James (1842–1910) and the other by Professor John Dewey, two of the foremost American writers on psychology. In his "Talks to Teachers on Psychology" (p. 29) James says, "Education is the organization of acquired habits of conduct and tendencies to behavior," and on page viii he says, "The aim of education is to make useful habits automatic." Here we have the emphasis placed on the habit element in education. On the other hand, Dewey says: "Education is the reconstruction of experience." Here the emphasis is placed, not on the fixing of former methods of behavior, but on the breaking up of habits and the readjustment of one's old methods of behavior to meet new and changing situations.

The apparent contradiction involved in these two definitions of education disappears, however, when we get a complete statement from one of the authors, in which both factors, habit and reason, are taken into consideration. Thus, James says:

> *We must make automatic and habitual, as early as possible, as many useful actions as we can. . . . The more of the details of our*

daily life we can hand over to the effortless custody of automatism, the more our higher powers of mind will be set free for their own proper work. There is no more miserable human being than one in whom nothing is habitual but indecision, and for whom the lighting of every cigar, the drinking of every cup, the time of rising and going to bed every day, and the beginning of every bit of work, are subjects of express volitional deliberation. Full half the time of such a man goes to the deciding, or regretting, of matters which ought to be so ingrained in him as practically not to exist for his consciousness at all. If there be such daily duties not yet ingrained in any one of my readers, let him begin this very hour to set the matter right. (**2**: 122)

This quotation gives the true relation to establish between habit and reasoning, and may well furnish a motto for classroom activity, namely, "Make habitual, as early as possible, as many useful acts as you can, in order that the minds of teachers and children may be free to consider problems that are worth reasoning about." We shall now proceed to apply this motto to the various routine aspects of classroom management which were outlined above on page 27.

Begin right the first day. — The first consideration in classroom management from the standpoint of routine is to get started right the first day. As James advises in the last sentence in the quotation given above, "begin this very hour to set the matter right." In other words, the time to set matters right is at the beginning. Any neglect of this advice results in lost ground which can only be recovered later by sacrifice of time and energy. James gives the following rule in this connection: "In the acquisition of a new habit . . . we must take care to launch ourselves with a decided initiative." Applied to the first day at school, this rule means that work should start off with a vigorous attack by pupils and teacher. It means that it is important to have the impressions of the first day be those that are to persist and give the keynote for the rest of the term.

Become acquainted in advance with the local situation. — In order to be able to do this, the beginning teacher, or a teacher in a new situation, needs to get on the ground some days before school opens and to familiarize himself thoroughly with the situation in general and in detail. This should include a study of the community, of the recent history of the school, of the ideals and policy of the present administration, of the building (with its classrooms, assembly arrangements, laboratories, gymnasium, heating and ventilating systems), of the school library and other neighboring library facilities. It would include also a careful examination of the course of study and of the annual and daily programs. This should lead to a definite planning of the work to be covered for the whole term in each subject or with each class. If it is the teacher's first year in teaching, he would do well to advise with several experienced teachers concerning the best pace with which to advance with the various classes.

Plan definite activities for the first day. — Having got the general situation in mind, he should plan in detail the work of the first week and be prepared to use the first class meeting for purposes of serious instruction. In order to do this he will have to make sure that the necessary materials are on hand, including possibly chalk, paper, maps, specimens, or whatever may be required.

The work of the first day may include three elements: (1) steps to acquaint the teacher with the students, (2) steps to acquaint the students with the general plans of the teacher, (3) some actual instruction. Any of these elements might occupy the whole period, but it is better to provide partially for each than to give up the whole period to any one. In order to provide for the first the teacher should have on hand a supply of cards or blanks, on which he asks the students to give certain definite information for which he has placed questions on the blackboard. To provide for the second he may present on the board, or in a talk, or by means of mimeographed copies, an outline of what the course will cover. This should not be a dry abstract, but should be sufficiently concrete and interesting to be understood by the pupils, who as yet may know nothing about the subject. Students like to know "whither they are bound," and a concrete presentation of some of the problems to be considered will help them in appreciating the general trend of the work as it develops during the term.

First-day instruction; review or introduction. — The third phase of the work of the first day — namely, instruction — may with advantage assume either of two forms: It may be a review discussion of the previous work of the students in the subject to be studied, and of related experiences, or it may be a conversational introduction to the new work. It is hard to imagine a subject in which either of these practices could not be followed to advantage; mathematics, foreign language, history, science, literature — all offer excellent opportunities for such introductory treatment.

With the first day used effectively in some such ways as have been suggested, the first step has been taken in the direction of economizing time and energy.

Assigned seats for pupils save time. — The second routine aspect of classroom management concerns arrangements for the seating of students for recitations. This matter is not so important in high school as it is in the elementary school, but it deserves some consideration in the former. If pupils are assigned regular seats, it makes for economy in a number of ways. In the first place, it enables the teacher to become acquainted with the pupils in a very short time. It also enables the teacher to take the attendance by a rapid inspection, thus saving the time that is often wasted in calling the roll. It facilitates returning papers, as these can be distributed to the places before the class assembles, or can be passed to the rows in a very short time. If only a few minutes are saved each day in this way, the total saving in the long run may be enormous.

Congestion relieved by routinizing passing. — The passing of pupils to and from recitations is a source of considerable waste of time. This waste usually occurs outside of the rooms, however; hence it is not so much a problem of classroom management as of general supervision. The passing from an assembly room may be organized by requiring rows to pass out in a certain order, thus saving several minutes. Similar precautions in congested corridors may also save time.

Tardiness results from congestion. — One of the results of confusion in passing between recitations is tardiness. Some of this is necessary, but much of it results from the general spirit of loitering which is encouraged by congestion. It is difficult to offer any helpful positive suggestions to reduce such tardiness, but there is one negative warning — don't lock the door to keep out late comers. In view of the well-known dangers from panic and fire it seems childish to offer this warning; yet in high schools and colleges it is periodically necessary for the administrative officers to send it out to instructors who have been violating the rule. Some instructors do not permit tardy pupils to enter. The disadvantages of this practice are that it often works an injustice to a student who is necessarily tardy and it takes the time of the instructor in arranging to have the tardy student make up the work. Some instructors count so many tardinesses as an absence, and require extra work to make this up. Some depend upon moral suasion in the form of discussions concerning the importance of promptness in social life, and call attention to such matters as the use of time clocks in factories and the financial loss from being late.

Economy in handling materials. *Large savings from slight variations.* — The fourth routine factor to be considered is the handling of materials. This is important in laboratory work in the natural sciences, in shop work, in theme work in composition classes, in the use of libraries, and in connection with notebooks. Enormous savings may be effected by a very slight change in equipment or methods of handling materials. A most striking example of this from the elementary school is the introduction of slates and blackboards and printed copy slips at the beginning of the nineteenth century. Up to that time quill pens were used, and each student went to the teacher's desk when necessary and had the teacher write a "copy" or a problem in his manuscript book. Two hours of the teacher's time each day was commonly taken up in making pens and setting copies. The introduction of slates and blackboards and the use of printed copy slips freed nearly all of this time, so it could be used for purposes of instruction — a most striking example of how improvement in routine or in the mechanical aspects of school work may make possible increased attention to the judgment factors.

System in handling laboratory apparatus and supplies.— In connection with laboratory work, examples of waste due to failure to provide for the proper handling of materials are constantly coming under observation. An example occurred in a domestic-science lesson in which it was necessary to use thermometers at a certain stage of the experiment. Most of the students reached this stage at the same time, and got to wrangling in trying to provide themselves with thermometers from one drawer where the supply was kept. This waste should have been avoided by having the thermometers distributed in advance or by a monitor shortly before they were needed. The general problem of economy in handling laboratory materials is discussed at length in Lloyd and Bigelow's "Teaching of Biology" (**4**); this should be read by all beginning science teachers and the general spirit of the directions carried out in all laboratories (biological, chemical, and physical) and in domestic science. Unless careful steps are taken to avoid it, there is probably more time wasted in laboratory work than in any other type of high-school exercise. If there is the least opportunity, many pupils will spend their time in "monkeying" and "fooling around" instead of attending to business; and often, even when they seem to be attentively working, their minds are off woolgathering in ways that would not be tolerated or even be possible in a recitation in mathematics or history or foreign language.

Example of waste and economy in manual-training shops. — The general plans for laboratory management which have been discussed may be applied to shop work in manual training and household arts and to work in drawing. In all of these subjects the arrangements should be so systematized that the students have practically all of the period to use for concentrated work instead of being delayed in securing materials; yet I have seen a whole manual-training class wait while the instructor sawed out boards on a circular saw into pieces for the students to use. The amount of time which it takes to make adequate preparation for classes is suggested by the statement of another manual-training teacher, who said that he had to work all day every Saturday getting out materials for the classes to use during the next week.

English teachers seeking economical methods in theme work. — One of the most striking examples of attention to the problem of waste of time and energy in connection with routine matters is the recent agitation among teachers of English regarding the reading and correcting of themes. These teachers have suddenly become conscious of the fact that they have been doing an overwhelming amount of work with no commensurate return, and are trying to discover whether better results can be secured with less expenditure of time through the use of improved routine devices. The National Council of English Teachers has been considering the matter for some time, and their discussions are rapidly producing results.

Devices for "red-ink economy" in composition work. — An account of some of the time-saving devices in English composition is contained in an article entitled "A Composition on Red Ink," from which the following quotations are taken:

Red ink is to our profession as drugs are to the medical profession. We cannot, or think we cannot, get along without it. But these are well-nigh drugless days. The medicine cabinet is smaller than it used to be. . . . I do not look to see red-inkless days; yet the time may come, and soon, when shallower ink bottles will be the mode. . . . I would gladly hasten the coming of such a time, and with this laudable purpose in mind I shall jot down all the ways I can think of in which red-ink economy may be practiced. . . .

1. *Call for less written work.* We have been composition mad for ten years. Never mind what Harvard thinks and does. . . . There is such a thing as overtraining. A few furlongs of the right sort of composition may be vastly more effective than as many miles of the humdrum variety.

2. *Call for shorter themes.* . . . A large amount of necessary training can just as well be carried on through the writing of twenty-minute or half-hour compositions, provided most of these . . . are written leisurely [and] carefully.

3. *Use the wastebasket.* But let [it] stand in front of the desk, not behind it. Don't put written work in it yourself; let the pupils put it in. . . . This applies to [some of] the written work done in class. . . . Pupils . . . can be made to understand that while it is good to have one's work carefully criticized, much can be gained by simply writing as well as one knows how. . . .

4. *Use college binders*, preserving in them all exercises done at home. Let the pupils keep these binders. Why? Because you must insist that before writing composition number two they examine composition number one and see what red-ink suggestions have been made. Otherwise, being but children, they will make the same mistakes over and over, which must be corrected over and over. (**7**: 273–277)

Reflecting lantern used to place theme before class. — The teachers of composition are also interested in securing material equipment which will assist them in their work. For example, they are interested in using a reflecting lantern by means of which a large part of a page from a theme may be thrown upon a screen for class criticism. Such a single object as the center of attention for discussion is superior to any other arrangement for getting the same material before the whole class. The teacher by using a pointer can easily and quickly direct the attention of all students to the same point. Lanterns which project an object eight inches square are now on the market.

Library economy; adequate equipment and management and definite assignments necessary. — The equipment and management of school libraries is another routine matter of considerable importance. It is probably better not to attempt to use the library at all for regularly assigned readings, than to have it managed in such a way that students waste hours of time trying to get the material to be read. A working library, equipped with several copies of books definitely usable in connection with class work, and properly catalogued and managed by a trained attendant, should be an essential part of every city high school. Such a provision is impossible in many high schools, but even where it is approximated, there is often enormous waste in using the library, owing to the failure of the teachers to provide for the routine aspects of the work. The principal errors are the following: (1) failure to "reserve" the copies of a book before referring the class to it; (2) referring a large class to a book of which there may be only one or two copies; (3) making the references so vaguely that a student has to spend considerable time in finding what he is to read.

Historical sources used economically in class. — An interesting example of economy in the use of supplementary reading is found in the use of sources in history by Mr. A. F. Barnard of the High School of The University of Chicago. As aids in the study of Greek and Roman history Mr. Barnard has in his classroom copies of each of the following: the Iliad, translated by Lang, Leaf, and Myers; Herodotus, translated by Rawlinson; and Xenophon's Memorabilia. When such a topic as the development of Greek religion is being studied, the copies of the Iliad are distributed on the desks while the students are assembling. When the earlier phases of Greek religion are to be discussed, the students are asked to open the Iliad to a definite page and line and to read. In the Herodotus and Xenophon the excerpts are read by the teacher at the appropriate places in the discussion. Thus, in a moment, without a second being wasted in getting at the books, the source material is placed before the pupils just when it can be used to best advantage. Pupils are expected to fix the results of the reading and discussion by taking notes, for which purpose a brief outline is generally placed on the blackboard as a guide.

Brevity and conciseness necessary in economical use of notebooks. — The economical use of notebooks is another routine factor of considerable importance. Notebooks are used in high schools as records of library reading, of laboratory work, and occasionally of lectures. There is little doubt that the keeping of voluminous, carefully written notes is a waste of the student's time. On the other hand, it is evident that a brief, concise record of the student's thought or reactions is desirable. The problem is to avoid the former and secure the latter, for even when the brief, concise, original statement by the student is asked for, he is likely to submit a voluminous copied statement instead. The desired end may be attained by some device which necessitates subdivisions or paragraphs that make the items in the report stand out clearly, and requires the use of concise forms of expression by the student.

Class outlines and syllabi to be mimeographed by skilled operator, not dictated. — As a final topic under the discussion of economy in using materials we shall consider the value of using machines for manifolding copies of lists of assigned readings, of laboratory directions, of class outlines and syllabi, etc. It is not uncommon for teachers to consume the time of pupils by dictating such material instead of having it printed in some way. Every large high school should have such mechanical devices and employ such clerical help as is necessary to manifold copies of all material that can be manifolded to advantage. The principal of the high school should see that this is done, and should stimulate the teachers to take advantage of the opportunity instead of waiting for the teachers to become so much interested in the matter that they request such assistance. The ordinary Edison rotary mimeograph is excellent for this purpose. From one well-cut stencil hundreds of clear copies may be run off in a few minutes. The work should be done by a person who has developed skill in the operations.

Teacher may use simple, inexpensive duplicator. — In case there is no central office in which a skilled operator does the manifolding for the whole school, it is possible for a relatively unskilled teacher to manifold his own material by using a duplicator or hektograph. Such an arrangement simply involves making one handwritten or typewritten copy, laying this on a specially prepared surface so that an ink impression is left, then removing the copy and pressing sheets of paper upon the impression. Fifty or more copies may thus be transferred without any special skill being required. An inexpensive duplicator could probably be easily secured through a local stationer, or even a homemade hektograph constructed by following one of the current recipes.

The manifolding of directions, syllabi, etc. not only saves much time but also stimulates more definite and careful organization of the courses of instruction. Furthermore, it removes many elements of uncertainty in assignments. If the assignments for a term's work are definitely made out in this way, the students have no occasion for misunderstanding what is expected of them.

This completes our discussion of economizing time and energy in the handling of materials. We have taken up only a few examples from laboratory and shop work, composition courses, the use of libraries and notebooks, and the manifolding of outlines. Many other examples could be considered to advantage, but enough has been said to demonstrate the importance of the topic and to suggest some of its practical possibilities.

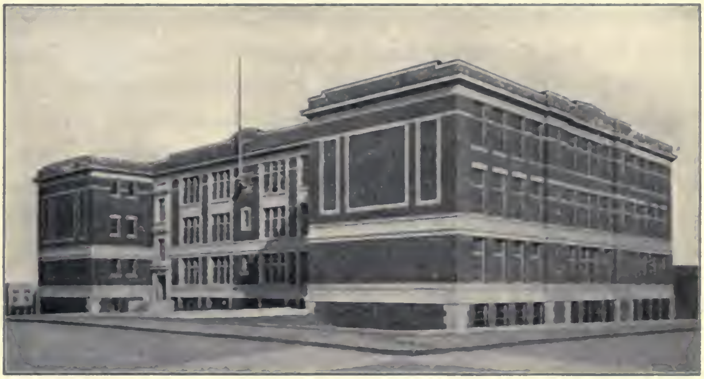
Proper ventilation and lighting conserve energy. — The fifth routine factor to be considered in economizing time and energy is attention to the physical conditions of the classroom. This is important not only from the standpoint of the temporary and permanent effect upon health, but also from the standpoint of waste of energy. If a room is poorly ventilated or lighted, the energy of the students which is available for concentrated study is diminished.

Teacher may supplement ventilating system; use of monitor. — The teacher should acquaint himself with the ventilating system and try to coöperate effectively in its management. If it does not work, he may be able to take steps to supplement it. For example, in two recitation rooms which I have used there was an ample supply of fresh air from the inlet in the wall near the ceiling in one end of each room. But in each case the outlet was placed in the wall near the floor directly under the inlet. As a consequence the air circulated very well in one end of the room, but three fourths of the room received practically no benefit from the system. Upon the suggestion of the teacher a metal deflector was made by the engineer and fastened on the inlet in such a way as to send the air diagonally across the room, thus providing a supply of fresh air for nearly all parts. In case there is no ventilating system, the teacher can at least provide for boards on the window sills. These will make it possible to keep the windows partly open during recitations in cold weather. It would also be well to have a monitor in each class, who should open the windows wide when the class arises to leave for the next recitation, thus providing for three or four minutes of thorough ventilation. The teacher should not rely upon his own impressions concerning the condition of the air in the room, for his sense of smell soon becomes fatigued in such a way that it does not inform him of the conditions.

Arrange so that students do not face the light.—In regard to lighting, the teacher's first duty is to arrange so that pupils do not sit facing the light. The frequent neglect of this simple precaution is very striking. In constructing library reading rooms it is not uncommon to find many readers placed so that they face low windows. Students often sit voluntarily in such positions that they receive the full glare of the light directly in their eyes but have their books so placed that these receive little illumination. In assuming such positions it would seem that they were handicapping themselves purposely in order to waste as much energy as possible.

Avoid shadows on the page. — The second precaution is to arrange so that there are no shadows on the page at which the pupil is looking. In other words, there should be the same degree of illumination all over the page. If this is not the case, the pupil of the eye is constantly readjusting itself to the different degrees of illumination. This is not only a waste of energy, but it is often quite distracting and annoying, although the reader may not be clearly conscious of the cause of the annoyance. We have extreme examples of this variation in illumination on a day when shifting clouds cause a rapid alternation of sunshine and shadow. The eyestrain under these extreme conditions is quite noticeable. When part of the page is well illuminated and the other part in deep shadow, the eyes may experience the same phenomenon on a smaller scale some fifty to a hundred times in reading a single page.

Single source of illumination best.—The first step usually taken to avoid such a situation is to provide that the light shall come from a single source. The student can then easily sit in such a position that there are no shadows on his page. If there are two sources of light, the possibilities of sitting so as not to have shadows and at the same time not to face a light directly are greatly reduced. If there are a great many near sources of illumination, as in a railroad coach at night, the page may be streaked with light and shadow. In constructing schoolrooms it is now quite common to provide that the light shall come only from one side (namely, the left), in order to avoid shadows. Even if there are several sources of light in a room, the teacher, by proper manipulation of the shades and by proper directions to the pupils, can greatly reduce the loss of energy which would result from reading under conditions that cause strain or distraction.



HIGH-SCHOOL BUILDING OF THE H-TYPE

Note the "blind" ends so constructed that the light in the corner rooms all comes from one side

Good order an important time-saver. *Favored by students.* —The sixth and final routine factor which we shall consider in our discussion of economy of time and energy is good order. Failure on the part of students to attend to business is an important source of waste in the classroom. As a rule, the teacher may assume that if the other conditions of instruction are properly provided for, most of the students will favor conditions of good order instead of disorder. There will always be a small minority of the students, however, who are not in school for serious purposes and who will make trouble if any opportunity arises.

Avoid opportunities for disorder through proper routine. — Hence one of the most important steps in securing good order is to eliminate as far as possible the opportunities for making trouble. Some of the most important steps in this direction involve carrying out the directions concerning the routinizing of classroom activity that were presented above. If the first day is begun with a businesslike spirit, if there are certain definite tasks to be accomplished concerning which there is a clear mutual understanding between teacher and pupils, if students are seated to the best advantage, if tardiness is avoided, if materials are so placed as to obviate wasteful movements, conflicts, and confusion, if the ventilating and lighting are so arranged as to contribute to vitality and comfort instead of fatigue, annoyance, and irritability — if all these matters are properly provided for, then many opportunities for disorder are eliminated.

Discipline easier in subjects providing definite tasks. — The simplifying of the problem of discipline through definite tasks which keep all students busy is illustrated in contrasting a class in algebra with one in history or literature. It is a simple matter so to conduct a class in algebra as to have every pupil responsible all the time for some definite objective work which requires his concentrated attention. It is much more difficult to do so with history or literature. Hence almost any teacher ought to be able to have constant good order in an algebra class but might be in constant difficulty with a history or literature class.

Discipline depends on teacher's personality; this is inborn. — Apart from proper attention to the routine factors to which reference has been made, the maintenance of good order depends largely on the teacher's personality. Since personality is to such a large extent inborn and not acquired, it does little good to discuss the aspects of personality that make for easy control. Nevertheless, a few statements may bring out some helpful suggestions.

Authority, dignified reserve, and friendliness as factors. — The problem of discipline has probably been given the most study in connection with certain systems of schools that have a more or less continuous history of several centuries, such as the great English secondary schools and the schools of certain Catholic organizations, notably the Brethren of the Christian Schools and the Jesuits. The following quotation from a book by a Jesuit is contained in the "Essays on Educational Reformers," by R. H. Quick, who introduces it with the statement that it illustrates how carefully the Jesuits have studied the teacher's difficulties. The quotation furnishes material for consideration or discussion, especially concerning the influence upon discipline of authority, of friendliness, and of dignified reserve on the part of the teacher.

> The master in charge of the boys, especially in playtime, in his first intercourse with them has no greater snare in his way than taking his power for granted and trusting to the strength of his will and his knowledge of the world, especially as he is at first lulled into security by the deferential manner of his pupils.
>
> That master who goes off with such ease from the very first, to whom the carrying out of all the rules seems the simplest thing in the world, who in the very first hour he is with them has already made himself liked, almost popular with his pupils, who shows no more anxiety about his work than he must show to keep his character for good sense — that master is indeed to be pitied; he is most likely a lost man. He will soon have to choose one of two things: either to shut his eyes and put up with all the irregularities he thought he had done away with or to break with a past that he would wish forgotten and engage in open conflict with the boys who are inclined to set him at defiance. These cases are, we trust, rare. But many believe with a kind of rash ignorance, and in spite of the warnings of experience, that the good feelings of their pupils will work together to maintain their authority. They have been

told that this authority should be mild and endeared by acts of kindness. So they set about crowning the edifice without making sure of the foundations, and, taking the title of authority for its possession, they spend all their efforts in lightening a yoke of which no one really bears the weight.

In point of fact the first steps often determine the whole course. For this reason you will attach extreme importance to what I am now going to advise:

The chief characteristic in your conduct toward the boys during the first few weeks should be *an extreme reserve.* However far you go in this, you can hardly overdo it. So your first attitude is clearly defined.

You have everything to observe — the individual character of each boy and the general tendencies and feelings of the whole body. But be sure of one thing, viz. that *you* are observed also and a careful study is made of both your strong points and your weak. Your way of speaking and of giving orders, the tone of your voice, your gestures, disclose your character, your tastes, your failings, to a hundred boys on the alert to pounce upon them. One is summed up long before one has the least notion of it. Try, then, to remain impenetrable. You should never give up your reserve till you are master of the situation.

For the rest, let there be no affectation about you. Don't attempt to put on a severe manner; answer politely and simply your pupils' questions, but let it be in few words, and *avoid conversation.* All depends on that. Let there be no chatting with them in these early days. You cannot be too cautious in this respect. Boys have such a polite, such a taking way with them in drawing out information about your impressions, your tastes, your antecedents; don't attempt the diplomat; don't match your skill against theirs. You cannot chat without coming out of your shell, so to speak. Instead of this, you must puzzle them by your reserve and drive them to this admission: "We don't know what to make of our new master."

Do I advise you, then, to be on the defensive throughout the whole year and like a stranger among your pupils? No! a thousand times, No! It is just to make their relations with you simple, confiding, I might say cordial, without the least danger to your authority, that I endeavor to raise this authority at first beyond the reach of assault. (**10**: 60–62)

Example of the importance of tact.— Among other personal qualities that are important in maintaining good order are tact, decision, and consistency. Lack of tact is illustrated by the incident of a high-school teacher who told her pupils that they need not come to class next day if they did not have their lessons better prepared. The class took her at her word and the next day remained quietly studying in the assembly room. When the principal asked them for an explanation, they gave him the facts and went on studying. The principal thought it was a good lesson for the teacher and left her to restore matters to their normal condition.

Importance of decision.— The influence of lack of decision is illustrated by the remark often made by a distracted mother when she says to her child, "I don't know what I will do to you if you don't behave yourself." No doubt teachers often find themselves in the same uncertain condition, but it does not improve matters to let the pupils know it. If possible, take the time which may be necessary to determine upon the best course of action and then proceed to carry out your decision.

Importance of consistency.— The influence of lack of consistency is illustrated by teachers and parents who are always threatening but never executing. They announce that certain consequences will follow upon certain acts and they are not consistent in carrying out their statements. Students very soon learn that they are likely to escape the consequences in many cases, and are willing to take the chances or to gamble on the issue.

Objective impersonal attitude better than emotional storm and stress.— In general, teachers will do well to endeavor to maintain a purely objective, impersonal attitude in most cases of disorder. As a rule the offense is essentially an offense against the class or group whose progress is interfered with.

As far as possible the notion that it is an offense against the teacher, and that a personal conflict between pupil and teacher ensues, should be avoided. Occasional outbursts of righteous indignation may be necessary, but they should be infrequent. For many persons, whether pupils or administrators, most emotional storm and stress is an unfortunate waste of energy which temporarily impairs their efficiency. Hence it should be avoided except in special cases.

One of the most interesting phases of the work of a dean or principal is the attitude of students who are summoned to the office to discuss the fact that they are falling below grade in their studies. Many of them enter as if the principal were a pursuing Nemesis ready with a sword to cut off their heads and thirsting for their blood. In order to appease the terrible monster they begin to say that they cannot understand why they have received such low grades, since they have been studying most conscientiously. It always astonishes them when they discover that the principal is not thirsting for their blood, but that, on the other hand, from a purely objective standpoint the excuse which they offer makes their cases almost hopeless, for if they have been failing when studying as hard as they possibly can, there is little hope for improvement.

Conclusion of discussion of routine. — This will conclude our discussion of the economizing of time and energy through careful attention to the more mechanical aspects of classroom management. Most educational idealists and theorists give these problems little attention, but they are important factors in the success of every kind of human organization ; hence they deserve special consideration in such a complicated social organization as the school.

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EXERCISES

For problems for class discussion of Chapter III, see *Exercises for "Methods of Teaching in High Schools,"* pp. E 28–E 33.

For problems on Chapter IV as well as additions to the bibliography, see pp. E 40–E 51 of the *Exercises.*

For the assignment of a paper based on the examination of high-school textbooks, see pp. E 36–E 39 of the *Exercises.*

CHAPTER IV

THE SELECTION AND ARRANGEMENT OF SUBJECT MATTER

Main points of the chapter. — 1. The material within the subjects of the curriculum should be adapted to varying social needs.

2. Social needs vary historically; hence material adapted only to needs that no longer exist should not be retained, and material adapted to new needs should be introduced.

3. Social needs vary between different communities; hence the subject matter appropriate in a rural high school is different from that appropriate in a city high school.

4. Social needs vary between different groups of students within the same community or institution; hence the material within a single subject (for example, mathematics, English, or science) should be varied accordingly.

5. In selecting topics it is not enough to show that they have *some* value; it must be clearly demonstrated that they have sufficient social value to justify the amount of time required to master them, and that they are *more valuable* than other possible topics.

6. In the content subjects (history, geography, science, etc.) it is important to avoid the encyclopedic treatment of many topics and to provide instead for the thorough, intensive study of a few topics.

a. This will provide that the one tenth of the subject matter that is remembered is worth remembering.

b. It will necessitate a wealth of forgettable details. These should be related to and should support the general principle or fact which is being taught; they should not be isolated and unrelated.

7. The order of topics in a subject should be decided by the needs, capacities, and interests of high-school students, not by the

nature of the subject itself or the interests of a specialist in the subject. For example,

a. In high-school mathematics this standard will require the inclusion of many practical problems and the mixing of the easier topics of algebra and geometry and some arithmetic in the first year.

b. The first year's work in science should consist of a general-science course, which should take its point of departure from practical issues in social life and should draw upon the various sciences for material which will throw light on these issues.

Relation to preceding chapters indicated.— In the two preceding chapters we developed two fundamental points of view which should be coördinated and kept in mind as the bases of progressive, efficient high-school instruction. The first of these emphasizes the conception of high-school instruction as organized on broad democratic lines to train pupils for morally directed social efficiency and for the harmless enjoyment of leisure time. The second point of view emphasizes the necessity of applying principles of effective business management to classroom instruction, in order that progressive ideals may be achieved economically and effectively.

Having gained an idea of the purposes that high-school teachers should try to achieve, and the fundamental principles of administration that should prevail in the classroom, we come to a more direct consideration of methods of teaching. Some of the problems involved will be taken up in the following order: (1) What principles shall guide us in choosing the subject matter to be used in order to achieve our purposes? (2) How do students carry on most economically and effectively the various types of learning involved in the types of subject matter which we select? (3) What incentives shall we use in order to get students to apply themselves so as to carry on the various learning processes to the best advantage? In the present chapter we shall take up the first of these problems, namely, the determination of the guiding principles in the selection and arrangement of subject matter.

Widespread interest in selection and arrangement of subject matter. — A thorough acquaintance with the subject matter that he is to teach has been generally admitted to be an important factor in a high-school teacher's efficiency. In fact, those educators who have been most skeptical concerning the importance of pedagogical training for high-school teachers have commonly maintained that a thorough knowledge of subject matter is the one thing that is necessary. This was for a long time the prevailing attitude among college professors, and to a large extent among high-school teachers themselves. In recent years, however, an increasing number of professors and teachers have manifested a strong interest not only in the *mastery* of subject matter but also in the discussion of the proper *selection* and *arrangement* of subject matter for the most effective teaching. This is especially evident in the proceedings of associations of the teachers of special subjects, such as history and mathematics. Notable examples of such discussions are found in the several reports issued during the last twenty-five years on the teaching of history. These include the report of the Madison Conference of 1892 (which was printed as part of the report of the Committee of Ten of the National Education Association), the report of the Committee of Seven of the American Historical Association (1899), and the report of the New England History Teachers' Association (1899). One of the latest significant reports on this subject is that of the Committee of Five of the American Historical Association, published in 1910. Similarly, in the case of literature, science, mathematics, and other subjects there is active discussion of the selection and arrangement of the subject matter that is appropriate for high-school courses.

Subject matter not to be arranged in inflexible order. — This activity is leading to a gradual disappearance of the idea that high-school subject matter is largely preordained in more or less fixed form, and that the teacher's duty is to conduct all children through it by the same road and with the same experiences. The newer and more flexible point of view may be discussed to advantage under the following four headings:

I. The selection of subject matter in relation to varying social needs.

II. The determination of relative values.

III. The intensive treatment of fewer topics.

IV. Organization in terms of the learner instead of in terms of the subject itself.

I. The Selection of Subject Matter in Relation to Varying Social Needs

Social needs vary historically; subject matter should vary accordingly. — The first point of view from which we shall consider the adaptation of subject matter to varying social needs is the historical one. As far as the high-school curriculum as a whole is concerned, the most striking example of the change in social needs is in the need for Latin. As shown above on page 8, when Latin secured its prominent place in the curriculum, in the sixteenth century and earlier, it was needed in nearly all pursuits and professions in which reading played an important part. At the present time, not one student in a thousand of those who enter high school will need Latin in anything like the way in which it was needed originally.

Spencer discussed varying social needs in relation to English secondary education. — One of the most vigorous and influential discussions of the desirability of adapting the school curriculum to social needs as they change historically is Herbert Spencer's essay entitled "What Knowledge is Most Worth." This essay was published in 1859 as an attack on the classical English secondary schools, which had continued to teach almost exactly the same subjects in about the same way as had been done in the sixteenth century, and had failed to take account of the enormous scientific and economic changes that had occurred in the meantime. In summarizing his criticism of this practice, Spencer wrote as follows:

> That which our school courses leave almost entirely out we thus find to be that which most nearly concerns the business of life. All our industries would cease, were it not for that information which men begin to acquire as they best may after their education is said to be finished. And were it not for this information, that has been from age to age accumulated and spread by unofficial means, these industries would never have existed. Had there been no teaching but such as is given in our public schools, England would now be what it was in feudal times. That increasing acquaintance with the laws of phenomena which has through successive ages enabled us to subjugate nature to our needs, and in these days gives the common laborer comforts which a few centuries ago kings could not purchase, is scarcely in any degree owed to the appointed means of instructing our youth. The vital knowledge — that by which we have grown as a nation to what we are, and which now underlies our whole existence — is a knowledge that has got itself taught in nooks and corners while the ordained agencies for teaching have been mumbling little else but dead formulas.

Dewey described curriculum changes in relation to social changes. — A more recent notable presentation of the necessity of adapting the curriculum to social needs as they change historically is the first chapter in Professor John Dewey's "School and Society" (1899). In establishing a general point of view from which to regard educational problems, he says:

> Whenever we have in mind the discussion of a new movement in education, it is especially necessary to take the broader, or social, point of view. Otherwise, changes in the school institution and tradition will be looked at as the arbitrary inventions of particular teachers — at the worst, transitory fads, and at the best, merely improvements in certain details; and this is the plane

upon which it is too customary to consider school changes. It is as rational to conceive of the locomotive or the telegraph as personal devices. The modification going on in the method and curriculum of education is as much a product of the changed social situation, and as much an effort to meet the needs of the new society that is forming, as are changes in modes of industry and commerce.

It is to this, then, that I especially ask your attention: the effort to conceive what roughly may be termed the "new education" in the light of larger changes in society. Can we connect this "new education" with the general march of events? If we can, it will lose its isolated character and will cease to be an affair which proceeds only from the overingenious minds of pedagogues dealing with particular pupils. It will appear as part and parcel of the whole social evolution, and, in its more general features at least, as inevitable. (**2**: 20)

Three types of historical changes affecting selection of subject matter. — The point of view which Spencer and Dewey discuss for the curriculum as a whole should be kept in mind by each high-school teacher in connection with the selection of the topics and material within a given subject. The topics and methods of treatment that are most appropriate now are not the same as they were five hundred or one hundred or even fifty years ago in most subjects. There are three types of historical changes that are responsible for this: namely, (1) general social changes such as the economic developments that Spencer and Dewey emphasize; (2) changes in the character of the subject itself; (3) changes in the character or selection of the pupils who attend the high schools.

Social changes affecting subject matter in history. — Consider, for example, the subject matter to be taught in history and civics.

1. The social changes that are influential here are the decline of religious and aristocratic control which for many

centuries was dominant in Europe and America; the corresponding development of democratic control, with the resulting necessity of developing democratic intelligence; the industrial revolution of the later eighteenth and early nineteenth centuries, which grew out of the development of the factory system; the resulting creation of large industrial cities and new political forces; the new and unsolved problems of domestic and civic life which are a consequence of the industrial development.

2. The changes in the nature of the subject of history itself parallel in a way these larger social changes. Instead of the histories of the clergy, such as prevailed in the middle ages, or of kings and of military and political events, which followed, or of constitutional history, which is still a large factor at the present time, history is beginning to be written from an economic point of view. In this economic interpretation of history the large part played in historical development by industrial changes is given special emphasis.

In the case of the subject matter of civics there is a transition from the exclusive discussion of national problems and the study of the national constitution to a study of local political and civic problems concerning which the ordinary citizen needs to be especially well informed.

3. As far as the students who study history are concerned, we have the change noted in Chapter I, from the selected "promising lads," who would go on to higher professional study, to a high-school enrollment that includes nearly all the types of students to be found in elementary schools, but many of whom will not go beyond the first year of high school.

Teacher of history should be guided by these facts. — From a study of these facts the beginning high-school teacher should learn to realize that the subject matter of high-school history is not a preordained, fixed system but is subject to large modifications. Hence he should become intelligently critical of the material which he may find in a given course of study, especially in the first year, and should raise such questions as the following: Does this material represent merely a survival of that which was adapted to former social conditions? Has it been carefully selected so as to be adapted to present social needs? Does it take account of changes in the subject itself? Does it best meet the needs of the more general class of students to be found in the first year of high school, who have had only the elementary work in American history and may never take any other courses in history?

Three stages in the history of botany: medical, systematic, evolutionary. — Further illustrations of the selection of subject matter from the standpoint of social needs as they vary historically may be found in many subjects. The sciences furnish some of the best illustrations. Take botany for example. In the Middle Ages and for some time thereafter it was pursued primarily as an aid to medical practice. Later it became highly specialized as a science in which the classification of plants seemed to be the beginning and end of all endeavor. And now, in its evolutionary aspects, with its investigations of the influences which determine the survival of plants, it is fundamentally related to the whole problem of agriculture and the supplying of food for the human race. In its bacteriological aspects it is vitally related to health.

Social value of geometry relatively unchanged in two thousand years. — There is one subject in the high-school curriculum which is peculiar in its relation to historical changes in social conditions. It is geometry. As a step toward acquiring higher mathematics which may be used in higher scientific work or engineering it has increased in importance; but from the standpoint of improvement in the subject itself or from the standpoint of its direct applied value for students who do not go on to higher mathematics it has changed very little through more than two thousand years. These facts are interestingly set forth by

Professor D. E. Smith in his book entitled "The Teaching of Geometry." After quoting a commentary on the work of Euclid, who lived about 300 B.C., Smith says:

> This characterizes the work of Euclid, a collection of the basic propositions of geometry, and chiefly of plane geometry, arranged in logical sequence, the proof of each depending upon some preceding proposition, definition, or assumption (axiom or postulate). The number of the propositions of plane geometry included in the "Elements" [of Euclid] is not entirely certain, owing to some disagreement in the manuscripts, but it was between one hundred sixty and one hundred seventy-five. . . . The efforts at revising Euclid have been generally confined . . . to rearranging his material, to rendering more modern his phraseology, and to making a book that is more usable with beginners if not more logical in its presentation of the subject. While there has been an improvement upon Euclid in the art of bookmaking, and in minor matters of phraseology and sequence, the educational gain has not been commensurate with the effort put forth. With a little modification of Euclid's semi-algebraic Book II and of his treatment of proportion, with some scattering of the definitions and the inclusion of well-graded exercises at proper places, and with attention to the modern science of bookmaking, the "Elements" would answer quite as well for a textbook to-day as most of our modern substitutes, and much better than some of them. (**3**: 52–53)

Geometry never has had much practical social value.— Concerning the practical, or applied, value of geometry for students who do not go on to a higher study of mathematics or science or engineering, Smith says:

> In view of a periodic activity in favor of the utilities of geometry, it is well to understand, in the first place, that geometry is not studied, and never has been studied, because of its positive utility in commercial life or even in the workshop. In America we commonly allow at least a year to plane geometry and a half year to solid geometry; but all of the facts that a skilled mechanic or an engineer would ever need could be taught in a few lessons. All the rest is either obvious or is commercially and technically useless.

We prove, for example, that the angles opposite the equal sides of a triangle are equal, a fact that is probably quite as obvious as the postulate that but one line can be drawn through a given point parallel to a given line. . . . [Such] theorems are perfectly fair types of upwards of one hundred sixty or seventy propositions comprising Euclid's books on plane geometry. They are generally not useful in daily life, and they were never intended to be so. There is an oft-repeated but not well-authenticated story of Euclid that illustrates the feeling of the founders of geometry as well as of its most worthy teachers. A Greek writer, Stobæus, relates the story in these words:

> Some one who had begun to read geometry with Euclid, when he had learned the first theorem, asked, "But what shall I get by learning these things?" Euclid called his slave and said, "Give him three obols, since he must make gain out of what he learns." (**3**: 7–8)

. . . it is evident that not more than 25 per cent of propositions have any genuine applications outside of geometry, and that if we are to attempt any applications at all, these must be sought mainly in the field of pure geometry. (**3**: 74)

The actual amount of algebra needed by a foreman in a machine shop can be taught in about four lessons, and the geometry or mensuration that he needs can be taught in eight lessons at the most. The necessary trigonometry may take eight more, so that it is entirely feasible to unite these three subjects. (**3**: 90)

Doubtful whether geometry is best for many high-school pupils. — These extended quotations from such a standard authority as Professor Smith may be accepted as stating authoritatively the relation of geometry to social needs as the latter have varied historically. Professor Smith proceeds to argue skillfully for the study of geometry upon other grounds. From the standpoint of this chapter, however, the statements concerning the small applied value of geometry would suggest the following conclusion: if, since the development of geometry historically, other subject matter has developed which is directly related to community needs, and this new subject matter can be organized effectively for purposes of instruction in the first two years of high school for students who do not intend to go to college, then it is no longer necessary to give courses in geometry to such students. Hence, though geometry may have been the best mathematics available for youth in past centuries, it does not follow that it continues to be the best subject matter available at the present time.

Social needs vary between different communities; subject matter should vary accordingly. — The first basis of variation in social needs and subject matter which we considered was the historical one. We shall now take up the second basis of variation, namely, variation between different communities. This is a basis that is rapidly securing the recognition which it deserves. This recognition is in striking contrast with the tendency to establish standardized, uniform courses of study in all communities, irrespective of their local needs, which prevailed as long as college-entrance requirements were the dominant influence in determining high-school curricula.

Small high schools should meet local needs. — One of the most vigorous discussions of the new tendency is an article entitled "The Opportunity of the Small High School," by David Snedden, Commissioner of Education for Massachusetts, from which the following quotation is taken:

> The conviction is slowly spreading that the traditional program of the small high school is, for those who do not reach college, a relatively futile affair when viewed from the standpoint of any one of the three possible aims of secondary education, namely, vocational efficiency, civic capacity, and personal culture. There is a growing demand, often inarticulate in communities supporting such schools, but finding more definite expression in circles where these problems can be systematically studied, that the artificial restrictions imposed on general secondary education be relaxed, and that such education be measurably readjusted so as to serve more acceptably the actual needs of the community. . . . Those responsible for the administration of the small high school must

needs give special attention to a determination of what is meant by community needs, on the one hand, and the educational possibilities of different groups of children of secondary-school age, on the other. (**4** : 100)

In continuing his discussion, Mr. Snedden takes up a consideration of the consequences, for the various subjects in the curriculum, of adapting them to the needs of communities where the small high schools are located. This suggestive discussion might be read by students to advantage.

Courtesy of Mr. H. A. Brown

READJUSTED ACADEMY AT COLEBROOK, N.H.

Reconstructed Colebrook academy is meeting rural needs in New Hampshire. — One of the most significant experiments along this line is taking place in Colebrook, in the northern part of New Hampshire, and is described in a bulletin entitled "The Readjustment of a Rural High School to the Needs of the Community" (1912). The broader social bearings of this experiment are so significant that a statement of them will be quoted at length from the bulletin as follows:

> A secondary school, whether located in a city, village, or rural hamlet, should be a source of strength to the community. The city or village in which a secondary school is located, and the entire

section of the country directly tributary to the school, should continually grow stronger as a direct result from the school. The school should constantly put back into the community the best of each generation as permanent residents if it is to justify its own existence and the taxation necessary for its maintenance.

That rural secondary schools have been in many instances a source of weakness to the communities which have supported them, and a direct means of taking out of the community the very manhood and womanhood so necessary to the future prosperity of state and nation, is one of the saddest aspects of modern education. State Superintendent Morrison has forcibly brought this fact home to the people of New Hampshire [in the following words]:

> During the first three quarters of the nineteenth century every group of three or four towns had its academy, usually an endowed institution. Out of these academies went a steady stream of sons and daughters, who were, other things being equal, always the strongest of the generation, for otherwise they would not have gained this education. Seldom did they settle upon the old farm or in the home town. Their education had fitted them for other things.
>
> They became lawyers, or physicians, or clergymen, or schoolmasters, or business men in the cities, and the girls went with them. . . . Their children grew up under city conditions and went to city schools. The unambitious, the dull, the unfortunate boys of the old countryside, who could not get to the academy, as a class, remained behind and became the dominant stock. And they reproduced their kind for another generation, upon whom the same sorting process was carried out. Then the factory system seized upon the strong-limbed and restless, albeit slow-witted, and began to sort them out and remove them. Finally, the Civil War came and struck down the idealists by the wholesale, mostly boys or young men who had not yet reproduced themselves in a new generation. Now, upon a journey through rural New England, you will see fine old mansions, showing by their architecture that they date back well toward the beginning of the nineteenth century, and ample old homesteads with their capacious barns, all of them more or less in a state of decay. . . . These were the homes of a race which lived and prospered, which cleared the land and built homes and added barn to barn, which accumulated wealth and gave virile expression of itself in Church, in State, and in educational institutions. . . . But that race allowed its sons and daughters to be educated away from the farm and the country and

from the state. In their place to-day we too often have a dwindling town, a neglected farm, a closed church, an abandoned schoolhouse.

The solution of this problem of the welfare of the rural sections of New England is a matter of great importance not only to the educator but to all classes of people. It is believed that the solution will come by means of a change in the type of secondary education. High schools and academies, with good courses in agricultural education for the boys and domestic arts for the girls, should create an interest in the farm and the home and their problems, and, by giving an education which prepares for the problem of life under home environment, will tend to check the present cityward trend of population. In this seems to lie the solution of one of the most vital and, in its consequences, one of the most far-reaching problems facing our people at the present time. (**1**: 25–26)

Courtesy of Mr. H. A. Brown

COLEBROOK ACADEMY BOYS LEARNING TO USE SEPARATOR

High-school mathematics adapted to rural needs. — The general principles of adaptation to community needs which are expressed in this quotation affect the teaching of every subject in the curriculum. As an example of this, note the effect upon the teaching of mathematics in Colebrook as stated in the following quotation:

> The students of the agricultural course take neither algebra nor geometry. In the first year they have a course in advanced arithmetic, which aims to be distinctly practical. It includes a review of elementary arithmetic and the advanced application of the subject.

Courtesy of Mr. H. A. Brown

COLEBROOK BOYS MAKING BABCOCK MILK TEST

> Such processes are taught as have a direct relation to the after lives of the pupils. Problems are selected which deal with actual situations and which grow out of the pupil's experiences. In the place of the geometry of the second year the agricultural students take a course called practical mathematics, which includes three lines of work: (*a*) the algebra of the equation; (*b*) the application of geometry to practical measurements; (*c*) the elementary principles of surveying. (**1**: 22)

Students to outline other examples of adaptation. — Other variations in the material of special subjects, to adapt them to varying local needs, can be outlined by students. For example, contrast the courses in domestic science in a select private secondary school for wealthy girls with the courses in the same subject for girls in settlement classes. Contrast the courses in chemistry in an agricultural high school with those in a high school in Pittsburgh, Pennsylvania. Contrast the work in manual training in rural and city high schools.

Courtesy of Mr. H. A. Brown

COLEBROOK CLASS SECURING SAMPLES OF SOIL AT DIFFERENT DEPTHS

Social needs vary between different groups within the same community or institution; subject matter should vary accordingly. — The heading of this paragraph sets forth the third phase of variation in the selection of subject matter. Between high schools in the same city, or even among several groups of students within a large cosmopolitan high school, there may be such variations in the needs of the different groups that the same subjects — English, mathematics, science, etc. — should be taught in different ways to meet the specialized needs.

Varied courses in composition in a cosmopolitan high school. — In the teaching of English composition we find striking examples. Thus, in a large cosmopolitan high school (that is, a school in which a variety of curricula are organized, including general and vocational courses) the students will be taught composition in different sections, or classes. The topics and training with each class will be related definitely to its vocational specialization or general interests. Thus, a commercial group would write business letters and advertisements, an industrial or preëngineering group might discuss machinery or bridges or similar topics, and a literary or college-preparatory group might choose topics from literature.

Courtesy of Mr. H. A. Brown

A LESSON IN THE GREENHOUSE AT COLEBROOK ACADEMY

Courses in history adapted to vocational students. — History is another subject in which the courses are being differentiated for different groups within the same school. Hence special attention is being paid to the organization of courses in industrial history for students in vocational curricula. Similarly, there is variation in nearly every subject in relation to varying vocational aims.

Science courses to meet special needs of girls. — One of the most striking variations is in the organization of special science courses for girls. In the biological sciences these courses are essentially related to physiology and hygiene for women. In chemistry the topics are chosen and organized with special reference to the work in domestic science. In general, the material and methods in all subjects taught in high schools are being scrutinized from the standpoint of instituting variations where necessary, in order to provide for the special needs of girls and women more definitely than has been done in the past.

Teacher must consider adaptation of subject to varying needs. — This will conclude our discussion of the selection of subject matter in relation to varying social needs. Sufficient has been said to demonstrate that the teaching of a given high-school subject is or should be no longer the simple matter that it sometimes has been, when all students were conducted through a given subject in exactly similar ways. Instead, a successful teacher is expected to study social progress and the developments in his special subject and to keep abreast with these and adapt his material to the special needs of the community and of the varying groups within the community that he serves.

II. THE DETERMINATION OF RELATIVE VALUES

Relative value distinguished from absolute value.—If a high-school teacher is committed to the practice of selecting subject matter in relation to varying social needs, he may find, if he is well acquainted with his subject and has a broad outlook, that the needs are so numerous, or the subject matter so rich, or the time so limited, that he will have to select carefully from available valuable material in order to use that which is *most* valuable for the group he is teaching.

Spencer's classic statement of the difference.—This question of *relative* values as distinguished from *absolute* values has been ably discussed by Herbert Spencer, from whom we quoted in the first part of the chapter. Spencer's discussion deals particularly with the curriculum as a whole, and is to be found in the early part of his essay entitled "What Knowledge is Most Worth." It reads as follows:

> The question which we contend is of such transcendent moment is not whether such or such knowledge is of worth, but what is its *relative* worth? When they have named certain advantages which a given course of study has secured them, persons are apt to assume that they have justified themselves, quite forgetting that the adequateness of the advantage is the point to be judged. There is, perhaps, not a subject to which men devote attention that has not *some* value. A year diligently spent in getting up heraldry would very possibly give a little insight into ancient manners and morals and into the origin of names. Anyone who should learn the distances between all the towns in England might, in the course of his life, find one or two of the thousand facts he had acquired of some slight service when arranging a journey. Gathering together all the small gossip of a county, profitless occupation as it would be, might yet occasionally help to establish some useful fact—say, a good example of hereditary transmission. But in these cases everyone would admit that there was no proportion between the required labor and the probable benefit. No one would tolerate the proposal to devote some years of a boy's time to getting such information, at the cost of much more valuable information which he might else have got. And if here the test of relative value is appealed to and held conclusive, then should it be appealed to and held conclusive throughout. Had we time to master all subjects, we need not be particular. To quote the old song:
>
> Could a man be secure
> That his days would endure
> As of old, for a thousand long years,
> What things might he know!
> What deeds might he do!
> And all without hurry or care.

But we that have but span-long lives must ever bear in mind our limited time for acquisition. And remembering how narrowly this time is limited, not only by the shortness of life but also still more by the business of life, we ought to be especially solicitous to employ what time we have to the greatest advantage.

Teacher should distribute time according to relative values. —The principle which Spencer proposes for determining the selection of the subjects of the curriculum applies with equal force to the topics within a subject. To carry out the principle, the teacher of a given subject must make a careful inventory of the possible topics, must establish clearly the *specific* value and purpose of each topic, and then by comparison arrange or grade the topics in order of greatest to least value. Having done this, he should plan to distribute the time and energy in such a way that when the course is completed, the emphasis will have been distributed according to the relative values of the topics.

Relative values neglected in overemphasis on early parts of a subject.—One of the most striking examples of the neglect of this principle is found in the tendency to spend too much time on the first parts of a course, to the neglect of the later parts. This is especially pernicious where the earlier parts are abstract and theoretical and the later parts concrete, practical, or applied. Courses in psychology for teachers furnish one of the best examples. It is not uncommon to begin such courses with long, elaborate introductory discussions of the organization of the nervous system and of the special sense organs and sensory processes. This often consumes so much time that there is little opportunity left to discuss the more concrete and significant aspects of human nature and human behavior in connection with instincts, habits, reasoning, language, and volition, and practically no time is available for discussing the educational bearings of these topics.

Overemphasis of early stages in history.—The same tendency to overemphasize the earlier aspects of a subject is found in history. In the study of American history in the grades we find this illustrated in the waste of time on explorations and discoveries in the sixteenth century, with the consequent neglect of the nineteenth century. In the so-called general history in high school we find it in the overemphasis on ancient and medieval history, with the consequent neglect of the development of modern Europe and the relation of the latter to American history. In the history of education in normal schools and colleges we find the same overemphasis on Greek and Roman education, and the consequent neglect of modern theory and practice.

Example from literature. — Another example of neglect of the principle of relative values is found in the study of literary selections in high school. A teacher, losing sight of the other matters that are in the course, is often carried away with the minute study of some one selection, say a play of Shakespeare, with the result that other selections equally worthy of time and study, or possibly more so, are slighted. Hence, it is not uncommon for a teacher to arrive at the end of a course and have to admit to himself and the students that matters which should have been taken up have not been touched upon.

The only way to avoid this danger is to plan the distribution of the topics and appropriate periods for the whole term in advance, and then to keep constantly checking the progress which is being made, to determine whether it corresponds to the plan, and, if it varies, whether the variation is justified.

Disagreement concerning relative values. — Great differences of opinion exist between teachers of the same subject concerning the relative values of different topics. Thus, in the study of literature one teacher may insist that the minute study of the details of "Ivanhoe" or "Macbeth" is more valuable than such a rapid study of these as will permit of the reading of several other selections also. Another teacher may be of exactly the opposite opinion.

Quantitative measurement versus qualitative studies in physics. — Another striking example is found in the teaching of physics, and concerns the relative value of exact quantitative measurement versus a more general study of physical phenomena. The following quotation from Professor A. A. Michelson of The University of Chicago, one of the leading American physicists, presents this antithesis.

> It is my belief that the teaching of physics might be made far more attractive as well as useful . . . if less stress were placed upon what has come to be regarded by many as its chief object, namely, the science of measurements. . . . I would therefore propose for discussion the feasibility of a plan for the teaching of physics which avoids as far as possible the use of mathematics of even the most elementary kind, and which gives to the science of measurement only a secondary importance. . . . It is more important to know the *nature* of physical relations than to know their exact value. It is of vastly greater value to know that all bodies attract each other than to know the law of inverse squares; to know that light is produced by a vibratory motion at right angles to the direction of propagation than to be able to calculate its wave length to seven significant figures. (**6**: 1)

The suggestion made by Professor Michelson in this quotation is being tested in the actual practice of teaching physics in high schools and is represented on a large scale in what is known as a "new movement" among physics teachers.

It will not be necessary to give further illustrations of the application of the standard of relative values in the selection of topics within a given subject. It would be an instructive exercise if each teacher or prospective teacher would canvass the subject matter of his particular subject, outline the particular topics to be covered, determine their specific values (that is, the reasons for teaching each), and then rate them according to relative values. This rating might then be compared with the relative emphasis given in textbooks or advocated in discussions.

III. THE INTENSIVE TREATMENT OF FEWER TOPICS

Encyclopedic tendency to be avoided. — In many subjects one of the most important principles in the organization of the material is to avoid the encyclopedic treatment of many more or less isolated topics, and, instead, to center the discussion around a comparatively few carefully selected large topics or principles. Each of these should be treated so concretely and fully as to make a lasting general impression upon the minds of the students, thus securing better understanding and better retention of the topic. The two subjects in which the encyclopedic tendency has been most prominent and most pernicious in the past are geography and history.

Ritter criticized encyclopedic tendency in geography.— This tendency as found in the teaching of geography at the beginning of the nineteenth century is well described in the following quotation from Karl Ritter (1779–1859), the German founder of modern scientific geography.

> [From the three traditional divisions, namely, mathematical, physical, and political,] our ordinary textbooks compile their usual aggregate of facts, and each becomes after its own pattern a motley in miniature. . . . A systematic exposition of geography is seldom to be found in them. . . . They are at the foundation only arbitrary and unmethodical collections of all facts which are ascertained to exist throughout the earth. . . . The facts are arranged as the pieces of a counterpane, as if every one existed in itself and for itself, and had no connection with others. . . . The beginning is usually made with *boundaries*, which are generally most unstable and uncertain, instead of being made with some rudimental fact around which all others arrange themselves as a center. . . . These geographical treatises . . . indicate knowledge rather than science; they form a mere aggregation and index of rich materials, a lexicon rather than a true textbook. And therefore ensues, despite the undenied interest of the subject and its high claims, the mechanical and unfruitful method only too common — the crowding of the memory without judgment, without thought. (**12** : xxiv)

Encyclopedic tendency still persists in some texts. — Since this statement by Ritter was published, the organization of the subject matter of geography has improved as the result of the labors of Ritter and his followers. Hence we have some textbooks in which the full treatment of fundamental geographic relations or topics is provided. But in many of the books the material continues to be organized as it was in the books that Ritter criticized, namely, with artificial political divisions serving as the starting point for the discussion, and with the information concerning each division set forth largely as isolated items or facts.

Regional geographies furnish an exception. — Exceptions to this encyclopedic tendency in geography teaching are the Oxford geographies, edited by A. J. Herbertson and published in England, and the methods advocated in the books by Charles McMurry in America. The Herbertson geographies place the emphasis on great "natural regions" (as was done by Humboldt, Ritter, Guyot, and other great geographers of the nineteenth century) instead of placing it on political divisions. For example, in the introduction to the study of Europe the first chapters are entitled The Seas and Lowlands, The European Highlands and their Rivers, The Climate of Europe, Plants and Animals, The Human Geography of Europe. These chapters are followed by discussions of the larger natural divisions of Europe, such as the Scandinavian peninsula, Central Europe, the Alps regions, etc. When an example of one of these types of regions has been thoroughly studied, it furnishes a basis for readily understanding and interpreting any similar region in any part of the world. That is, the relatively complete study of certain fundamental geographic relations in a typical example leaves a general impression that may be applied very widely by the student in his later thinking. For a discussion of the natural regions of the earth considered as a whole, see Herbertson's "Senior Geography" (**9**) and his paper on "The Major Natural Regions." (**8** : 301–312)

Type studies advocated by McMurry. — In America we are more familiar with this type method in geography in connection with the books of Charles McMurry. The general pedagogical principles involved are discussed at length by the McMurry brothers in "The Method of the Recitation" (1903), perhaps the most widely used and certainly one of the best books dealing with methods of teaching published in America. Illustrative lessons which are printed in the book show very clearly what is meant by the type method. For example, on pages 17–24 is printed a long lesson on Minneapolis, which is intended to give pupils an understanding of the development of manufacturing and commercial cities by means of a careful, detailed study of one typical example and a comparison of it with a few other selected examples. Similarly, on pages 257–269 there is a lesson on irrigation which provides a comparatively thorough general understanding of this important topic by means of a careful, detailed study of one irrigation system (the Big Ditch near Denver) and a comparison of this with a few other selected examples. These sample lessons should be examined and Chapter X (pp. 236–256), entitled The Value of Types, should be read.

Encyclopedic tendency dominant in history textbooks. — History is another subject in which the encyclopedic summary of hundreds of relatively isolated and meaningless facts has been prominent. This fact is so patent that it scarcely needs to be elaborated. Simply call to mind some of the most widely used historical textbooks, and many of them will serve as examples of the encyclopedic tendency. Instead of treating a few large, important issues in a thorough manner, so that students will get some real understanding of historical relationships and developments, thousands of items of information are provided on the same dead level of insignificance.

Robinson's texts furnish an exception. — There are some pleasing exceptions to this unfortunate rule. Several of the recent textbook treatments of the Middle Ages and the

Renaissance are good examples. For instance, in Professor J. H. Robinson's "History of Western Europe" the chapters on The Crusades, Heresy and the Friars, and The Italian Cities and the Renaissance are treatments of big historical topics, or units, in such a concrete manner as to give the student some definite and lasting impression of what the historical situation in each case was like. In his preface Robinson says:

> It has seemed best, in an elementary treatise upon so vast a theme, to omit the names of many personages and conflicts of secondary importance which have ordinarily found their way into our historical text-books. I have ventured also to neglect a considerable number of episodes and anecdotes which, while hallowed by assiduous repetition, appear to owe their place in our manuals rather to accident or mere tradition than to any profound meaning for the student of the subject.
>
> The space saved by these omissions has been used for three main purposes. Institutions under which Europe has lived for centuries, above all the Church, have been discussed with a good deal more fullness than is usual in similar manuals. The life and work of a few men of indubitably first-rate importance in the various fields of human endeavor — Gregory the Great, Charlemagne, Abelard, St. Francis, Petrarch, Luther, Erasmus, Voltaire, Napoleon, Bismarck — have been treated with care proportionate to their significance for the world. Lastly, the scope of the work has been broadened so that not only the political but also the economic, intellectual, and artistic achievements of the past form an integral part of the narrative. (**13**: iii)

It is to be hoped that more textbooks in both history and geography will be constructed with the purpose of providing an *understanding* of the topics treated, instead of being constructed as if they were to serve as miniature encyclopedias for reference purposes.

Type studies common in biology.—A subject in which the use of type studies has received quite general recognition is biology. This point is brought out in the following quotation from Lloyd and Bigelow's "Teaching of Biology."

> There seems to be no question that an elementary course in zoölogy in a secondary school should be based upon and consist largely of the study of a series of types, or examples, representing the most important groups of animals. No other plan is adaptable to the modern laboratory method of teaching the principles of the science, and concentration of attention upon a limited number of forms undoubtedly results in the most satisfactory training in the method of scientific study. Even from the standpoint of the acquisition of information the type method has great advantages over the alternative plan of dealing in generalized comparative terms with characteristics of a group of animals with most of which the students must be entirely unfamiliar. (**10** : 357)

The same general principle applies in the teaching of botany, but in order to become familiar with the different interpretations of the type method in this subject the student should read also pages 106–115 of the book from which the above quotation is taken.

Examples of intensive study in other subjects. — It is in the content subject that the more intensive thorough treatment of fewer topics is especially important. The discussion up to this point has contained illustrations from geography, history, and biology. It is a simple matter to provide further examples from chemistry, physics, domestic science, and possibly from other subjects. Similarly, in the constructive subjects, such as art and manual training, we find a tendency to get away from the courses of study made up of isolated detailed exercises and to substitute work on larger projects.

Many supporting details necessary in intensive study. — The part played by *details* in the intensive treatment of a few topics, as contrasted with the part which they play in the superficial encyclopedic treatment of many topics, deserves special consideration. There will be just as many details used in the former method as in the latter, but their character and purpose will be quite different.

In the encyclopedic treatment of many topics we find thousands of details that are more or less isolated in character. They do not contribute to form a general impression or general idea, but often seem to be on the same dead level of insignificance. On the other hand, the details provided in the intensive treatment of a few large topics are carefully selected and arranged for the purpose of contributing to the better understanding of the general topics. They may be spoken of as *supporting* the general principle or general impression. They may be said to make the matter under consideration *meaningful*. Thus, the statements, "Petrarch was the leading Italian humanist of the fourteenth century; he wrote sonnets in the vernacular, was active in searching for classical manuscripts, and wrote a Latin poem entitled 'Africa,'" are relatively meaningless for most pupils, because they present a few ideas without sufficient filling-in of supporting details to give them meaning. These statements will be filled with meaning, however, if the pupil will read Robinson and Rolfe's "Petrarch." Here he will find the account of Petrarch's passion for Laura, and will get the sonnets to her placed in their human setting; he will learn of Petrarch's journeys to different places in search of manuscripts, of his adventures on the road and at wayside inns, etc.; and he will get an insight into Petrarch's ambition to emulate the ancient classical writers and to be crowned with the laurel wreath at Rome.

Details necessary to give meaning but do not constitute meaning. — These details will have served their purpose when they have built up in the pupil's mind the meaning of the statement about Petrarch with which we began. It is not necessary that they be remembered in order that this meaning may be and remain perfectly clear and adequate for use in the future. The understanding or appreciation of the meaning has been built up on the basis of the details, but it does not consist of these details.

Details to be forgotten; general meaning remembered. — Once they have served their purpose, the details may be forgotten, and probably should be forgotten for purposes of mental economy. It is commonly said that nine tenths of what we learn in school is forgotten. This is probably true. Therefore it is especially important that some method be adopted that will assure that the one tenth that is remembered is worth remembering. As long as encyclopedic, unrelated, unorganized details are taught, the part that will be remembered depends largely on chance. On the other hand, if large, fundamental issues are emphasized, and the details so selected and arranged as to bring the large issues to a clear focus, we may feel reasonably sure that these will be the parts that will be remembered.

IV. ORGANIZATION IN TERMS OF THE LEARNER INSTEAD OF IN TERMS OF THE SUBJECT ITSELF

A vital issue in high-school instruction. — The fourth aspect of the selection and arrangement of subject matter which we shall consider concerns its organization in terms of the learner instead of in terms of the subject itself. This is one of the most vital issues before high-school teachers at the present time. It is being actively considered, especially in the case of first-year science and mathematics, and deserves consideration in several other subjects, such as chemistry, physics, domestic science, and drawing.

Rousseau advocated psychological arrangement. — While the consideration of this problem in relation to instruction in American high schools is relatively new, the problem itself has been discussed in books on teaching for a long time. Thus we find Rousseau (1712–1778) writing as follows in the "Émile," which was published in 1762 and which exerted a more profound influence upon education than any other book written in modern times.

> There is a chain of general truths by which all the sciences hold to common principles and are developed in logical succession. This chain is the method of the philosophers, but in this place we are not at all concerned with it. There is a totally different one, by means of which each individual object brings forth another and always points out the one which follows it. This order, which through a continual curiosity stimulates the attention required of us, is the one which most men follow, and especially the one required of children. (**20** : 45)

Herbart criticized basing sequence on subject itself.— Similarly, Herbart (1776–1841), the great German writer upon education, said in his "Outlines of Educational Doctrine":

> The teacher in charge of a given branch of study only too often lays out his work without taking account of pedagogical considerations. His specialty, he thinks, suffices to suggest a plan; the successive steps in its organized content will of course be the proper sequence for instruction to follow. In teaching a language he insists that pupils must master declensions and conjugations in order that he may read an author with them later. He expects them to understand ordinary prose before he passes on to elucidate the finished style of a poet, etc. In mathematics he demands that pupils bring to the subject perfect facility in common arithmetic; at a more advanced stage they must be able to handle logarithms with ease before formulæ requiring their use are reached, etc. In history the first thing for him to do is to erect a solid chronological framework to hold the historical facts to be inserted afterward. For ancient history he presupposes a knowledge of ancient geography, etc. This same view which derives the principle determining the sequence of studies from the instruction-material itself, as though it had been unconditionally and finally settled that such and such things *must* be taught, asserts itself on a larger scale in requirements for admission to higher grades or schools. . . . The good pupil, accordingly, is one who fits into and willingly submits to

these arrangements. The natural consequence of all this is that little heed is paid to the condition of attention, namely, the gradual progress of interest. (**17**: 93–94)

These quotations present the issue clearly: Should the arrangement of the topics in any subject be determined by the relations of the topics to each other independent of the learner's ability to grasp them and of his interest in them, or should these considerations relative to the learner be the dominant factors in determining the arrangement of topics?

Elimination of high-school pupils partially due to organization of courses. — This problem is becoming especially important in connection with the work of students in the first year of high school. The recently ascertained facts about the elimination of students from school are partially responsible for the interest in the problem. Statistics show that a large proportion of grammar-school pupils are willing to go to high school, but something which they experience in the first year tends to discourage them, and they drop out.

Courses not adapted to needs, interests, or capacities. — One of the principal factors in this discouragement is that the material in the various subjects is not selected or arranged in such a way as to be adapted to the students' interests. Consider a typical first-year high-school curriculum of the traditional type from the standpoint of a vigorous, ambitious student interested in American life of the twentieth century: a foreign language (ancient or modern) which bears no relation to his out-of-school life, probably taught by a dry and uninteresting grammar-translation method; algebra, a formal juggling of symbols, a mathematical mental gymnastics, equally remote from his out-of-school life; possibly botany or physiography taught as pure sciences without reference to their practical applications; rhetoric and English composition; perhaps some gymnastics and music, taught in such a way that many of the pupils consider them "mild forms of punishment." The wonder is that as many pupils stay as do. Many who would be discouraged as far as any intellectual or practical profit is concerned stay because they are attracted by the social life or the prestige that attaches to high-school graduation.

Reconstruction of first-year mathematics. — The problem of adapting the instruction to the needs and interests of the students has been discussed and experimented with most vigorously in the case of mathematics. The leader in the endeavor to psychologize this subject in England is John Perry; hence the effort is known in that country as the Perry Movement. In America the most energetic experimentation has centered in The University of Chicago under the leadership of E. H. Moore, head of the department of mathematics. One of the best accounts of the movement is to be found in J. W. A. Young's "Teaching of Mathematics," Chapter VI (pp. 87–121), entitled The Perry Movement: the Laboratory Method. A conservative evaluation and a careful adaptation of some of the good points in the movement are to be found in A. Schultze's "Teaching of Secondary Mathematics." This book is an excellent practical guide for teachers of mathematics who wish to teach the subject in a manner that is somewhat adapted to the needs, capacities, and interests of high-school pupils.

Applied problems appeal to practical interests. — One of the principal points of departure in reorganizing mathematics so as to make it appeal to the interests of the students is to relieve it of its abstractness and remoteness from real life to a certain extent by bringing in practical applications or real problems. As we noticed in the first section of this chapter (pp. 57–60), the possible applications of elementary mathematics (algebra and geometry) in ordinary life are relatively limited; hence the possibilities along this line should not be overestimated or exaggerated. But a slight amount of application may develop an interest which is proportionately much greater. This is true in many subjects, notably in psychology as applied to education. If the prospective teacher who is studying psychology gets now and then a grain of applied (or applicable) knowledge, the whole subject may become suffused with interest. In discussing the endeavor to make mathematics interesting through the use of applied problems Schultze says:

> Elementary mathematics has not many genuine applications, but still it has some. The study of these applications will undoubtedly increase the interest in the subject; frequently it will also lead to a better understanding of the subject; and occasionally it may be of practical value to some student. . . . We must not, in order to obtain practical value, deprive the subject of its peculiar character of being a subject of reasoning. But, *other things being equal*, that topic deserves preference that can be applied or that will *ultimately* lead to applications. . . . Thus, we may well dispense with some of the complex cases of factoring and study instead graphical methods, which have a greater practical value than any other chapter of elementary mathematics. . . . Instead of substituting numbers in expressions formed at random let us study numerical substitution in formulæ of practical value. (**21**: 279–281)

Teaching the use of logarithms and the slide rule in connection with algebra is another example of the possibility of bringing out some of the practical aspects of mathematics. In this connection Schultze says:

> Although the increasing use of calculating machines has somewhat diminished the practical importance of logarithms, the subject is still the most useful one in elementary algebra. Hence it is necessary to make the student so familiar with the practical use of logarithms that he can do the work accurately and quickly. (**21**: 350)
>
> The slide rule is a very simple instrument which calculates mechanically products, quotients, powers, roots, etc. Its principle is based upon the properties of logarithms, which are most lucidly illustrated by means of this instrument. No teacher who is able to secure some slide rules should neglect to explain to his students the principle and use of this wonderful little machine. (**21**: 352)

While these last examples do not bear upon the first year's work in mathematics, they illustrate the possibility of increasing the interest in some of the later parts of the subject of mathematics by means of practical applications.

Unification, or mixing, of various parts of mathematics.— A second phase of the reconstruction of the teaching of mathematics so as to adapt it to the needs and interests of students is expressed in the following quotation from an article by Professor D. E. Smith on "The Teaching of Mathematics in the Secondary Schools of the United States."

> There is another influence that is bound strongly to mold the future, and that is the intense study of practical psychology. Teachers are asking why the human mind should be asked to comprehend certain exceedingly abstract principles of geometry before the much easier parts of trigonometry are mastered; why the intricacies of advanced algebra are required before the simpler parts of the calculus are presented; and why, in general, there should be the conventional and accidental barriers maintained between algebra and geometry, and geometry and trigonometry, and the calculus. (**22**: 210)

New types of textbooks in first-year and second-year mathematics.—Among the best examples of the endeavor to carry out the suggestions contained in the foregoing quotations, as far as the first and second years of high school are concerned, are the revised courses in "first-year mathematics" and "second-year mathematics" which have been worked out in the high school of The University of Chicago.

In the description of this work in the announcement of the University High School the following statements occur:

> FIRST YEAR
>
> The text of the first year is "First-Year Mathematics." This book, prepared by the members of the mathematical department, has been used for seven years in the classroom. It interweaves the more concrete and easier portions of algebra and geometry.

In the first chapter the algebra work is developed about the equation, the axioms of the four fundamental processes are stated and illustrated by concrete examples, and all transformations of equations are made on the basis of these laws. Algebraic problems are developed from the laws of percentage and from the sides, angles, and areas of polygons. The laws of the lever and of beams are established by experiments in the classroom and are made the basis for the developments of the fundamental processes and the laws of signs. Drawing to scale gives many problems in similarity of triangles and in ratio and proportion. Parallel lines, perpendiculars, bisectors, and other geometrical concepts and constructions are used to set forth the notions and laws of algebra. The pupil is early taught to graph on cross-section paper statistics, equations, and general expressions of number. Throughout the course the graph is made an instrument for picturing conditions and laws and for verifying results. To secure mastery of the equation as an instrument for the solution of problems, considerable practice is given in stating verbal problems in the form of the equation and in translating formal equations into verbal language.

To emphasize the applied features of algebra and geometry, as well as to prepare for work in physics, many problems are taken from the latter science, and many formulæ of physics are translated into verbal language and are also solved for different symbols. In the study of factoring, application is made at once to operations with fractions and the solution of quadratic and higher equations. The operations with radicals are applied to the obtaining of approximate values of incommensurable parts of regular polygons and circles and to the verification of irrational roots of equations. Simultaneous equations with three or more unknown quantities and a considerable body of geometrical theorems on congruency of triangles and parallelograms complete the text.

SECOND YEAR

In the second year, "Second-Year Mathematics," also prepared by the department, is used. This is a continuation of the interweaving of geometry and algebra, but with the stress on geometry. The first two years give all the algebra usually taken in first-year courses, and the geometry of the second-year courses, including constructions with compasses and rule, proofs of the standard theorems on equalities, inequalities, and similarity, areas, regular polygons, and circles, besides much practice in algebraic processes based on such theorems; and in connection with similar triangles the notions of the trigonometric functions and their use in the solution of the right triangle.

Revisions of older books defer difficulties and introduce applied problems. — In addition to the tendency to write new textbooks in mathematics from the standpoint of the needs, interests, and capacities of high-school pupils we find some of the older textbooks being revised from this point of view. For example, in the preface to the 1911 edition of a well-known first-year algebra we find the statement that certain difficulties are deferred until the pupil is able to cope with them; easy aspects of some of the topics usually treated late in the course are introduced early in the work; the problems are based largely on interesting facts derived from a variety of sources, including physics, geometry, and commercial life. In addition to these statements, however, there are others which indicate that many of the characteristics of the older books are retained.

Thus we see that high-school mathematics, which has long stood as the best example of a logically organized subject, is being psychologized, reconstructed, and reorganized in terms of the needs, capacities, and interests of the students.

Reconstruction of science courses. *First-year general science based on pedagogical considerations.* — The course in science in the first year of high school furnishes the next most striking example of this psychologizing, or reconstructive, tendency. In general the reform movement in science has the same characteristics as the movement in mathematics. Instead of separate, abstract courses in botany, physiology, and physiography in the first year, with chemistry and physics in later years, there is a tendency to organize in the first year a general-science course which shall take its point of departure from practical issues in social life, in which the natural sciences are important, and then draw upon all the sciences, both biological and physical, for the material of instruction relative to these issues.

Specialist in single science not competent to organize courses. — In discussing the necessity of a general reconstruction in the teaching of science, Professor C. H. Judd says:

> Science teachers are [ordinarily] not willing to examine and discuss the needs of their students as a primary consideration in the organization of their courses. Science has a kind of inflexible logic of its own in the mind of a mature teacher — has a kind of coherency in organization that is so attractive that to break down this ideal arrangement in any wise . . . is very repugnant for the true scientist. I sympathize with this respect for the logic of science. I should be very glad indeed if we could begin and go on without any repetition in a coherent march through [a given science] in such a way as to bring the student into exact knowledge and into precise forms of reasoning — I say I should be glad if that could be done without leaving the path of logical order. But the fact of the case is that it cannot be done. . . .
>
> I think there are some teachers who are overtrained in science; that is, I should say they are overtrained in a single science. . . . That these specialists should be guided is as important as that they know their subjects. . . . When you get a specialist who is so absorbed in one subject, you have, from the point of view of the administrator of a high school, a very serious problem. It is the problem of organizing a course of study for students with a man who has forgotten the students. (**18**: 91)

Examples of general-science courses. — Two examples of attempts to organize first-year general-science courses are outlined below. They depart radically from the ordinary courses in the separate sciences, but it is evident that the first course outlined is based largely on the physical sciences, whereas the second course outlined is based largely on physiography, physics, and the biological sciences.

The first outline shows the chapter headings of one of the few books of this kind that have appeared up to the present time (1914). **(15)**

I. Heat.
II. Temperature and Heat.
III. Other Facts about Heat.
IV. Burning, or Oxidation.
V. Food.
VI. Water.
VII. Air.
VIII. General Properties of Gases.
IX. Invisible Objects.
X. Light.
XI. Refraction.
XII. Photography.
XIII. Color.
XIV. Heat and Light as Companions.
XV. Artificial Lighting.
XVI. Man's Way of helping Himself.
XVII. The Power behind the Engine.
XVIII. Pumps and their Value to Man.
XIX. The Water Problem of a Large City.
XX. Man's Conquest of Substances.
XXI. Fermentation.
XXII. Bleaching.
XXIII. Dyeing.
XXIV. Chemicals as Disinfectants and Preservatives.
XXV. Drugs and Patent Medicines.
XXVI. Nitrogen and its Relation to Plants.
XXVII. Sound.
XXVIII. Musical Instruments.
XXIX. Speaking and Hearing.
XXX. Electricity.
XXXI. Some Uses of Electricity.
XXXII. Modern Electrical Inventions.
XXXIII. Magnets and Currents.
XXXIV. How Electricity may be Measured.
XXXV. How Electricity is made on a Large Scale.

In the development of each of the above topics the book gives practical illustrations taken from everyday life. For example, the first chapter, on heat, contains a section on methods of heating buildings, with subtopics as follows: open fireplaces, stoves, hot-air furnaces, hot-water furnaces.

General-science course of The University of Chicago High School. — The following outline gives the main topics in a general-science course that has been constructed in the high school of The University of Chicago and is now published in somewhat modified form as a textbook. **(14)**

Part I. The Air

I. Some Physical Characteristics of the Air.
II. Temperature Changes and the Seasons.
III. The Water of the Air.
IV. The Weather.
V. Composition of the Air — Molecular Theory.
VI. Composition of the Air — Atomic Theory.
VII. Relation of the Air to Chlorophyll Work.
VIII. Dust, Molds, and Bacteria of the Air.
IX. Flying Insects as Distributors of Bacteria.

Part II. Water and its Uses

X. Ice, Water, and Steam.
XI. Evaporation and Condensation.
XII. Melting and the Melting Point.
XIII. Water Pressures, Buoyancy, and Density.
XIV. Climatic Influences — Chicago and Lake Michigan.
XV. Commercial Relations — Chicago and Lake Michigan.
XVI. Water Supplies for City and Country.
XVII. Water and Sewage Disposal.

Part III. Work and Energy

XVIII. Work by Running Water.
XIX. Work and Machines.
XX. Mechanical Energy.
XXI. Heat and Work.
XXII. The Sun as a Source of Energy.
XXIII. Energy for Plants and Animals.

Part IV. The Earth's Crust

XXIV. Effect of Natural Forces upon the Earth's Surface.
XXV. Structure and Composition of the Soil.
XXVI. Origin of the Soil.
XXVII. Soil Water, Drainage, and Irrigation.
XXVIII. Erosion and Sedimentation.
XXIX. Life in the Soil.

Part V. Life upon the Earth

XXX. The Plant Covering of the Earth.
XXXI. Absorption from the Soil and Air by Plants.
XXXII. The World's Food Supply.
XXXIII. Utilization of Food in the Plant.
XXXIV. The Nutrition of Animals.
XXXV. Classification of Plants and Animals.
XXXVI. Reproduction in Plants and Animals.
XXXVII. The Struggle for Existence.
XXXVIII. Parents and Offspring.

Advantages of a general-science course.—The advantages of a properly constructed and well-conducted general-science course in the first year of high school may be briefly summarized as follows:

1. For the great numbers of students who do not go beyond the first year it will give an insight into the various sciences in their manifold applications.

2. For those students who continue in high school it will develop an interest and an insight that will be helpful in their election of other science courses and will illuminate these.

3. For all students it will provide superior training in scientific method and the application of this method to the actual problems of life, for instead of providing merely for the relatively abstract study of a single science, it will require on the part of the pupils independent reflective thinking in connection with the type of problems that they will meet out of school.

Logical quality of reconstructed courses. — We noted in Chapter II that the terms *culture* and *liberal education* carry a certain dignity and respect which tends to be attached to any system of education to which they may be applied. Hence, in order to secure such dignity and respect for the newer types of education, we found it necessary so to define these badges of respectability as to make them applicable to the newer education. The same process is necessary in connection with the term *logical*, since to say that a subject is "logically organized" tends to bias one immediately in its favor.

Logical, progressive coherency possible in a practical outline. — The phrase *logical organization* has commonly been interpreted in terms of the impression made by the finished outline of a course prepared by the teacher in the form of a syllabus or a book to be used as a guide by the students who are to study the course. Coherency, or connectedness, and organization in terms of main divisions and subdivisions are usually the bases of judgment in determining the logical quality of the product from this point of view. If we accept for a moment this basis for estimating logical quality, it is important to notice that the basis of coherency, or connectedness, may be either (*a*) *abstract* in terms of a single subject or (*b*) *practical* in terms of the ways in which various subjects, or fields of knowledge, contribute to the consideration of certain practical issues. For example, a textbook on psychology might be considered logical from the first point of view if its various topics were so organized and related as to support each other, so that discussions outlined in the beginning would lead up to later discussions and serve as factors of explanation in these. On the other hand, a textbook on pedagogy, like the present volume, might be organized logically from the second, or practical, standpoint, namely, from the standpoint of methods of teaching in high school. It might establish certain fundamental considerations first, which would serve as factors of explanation in the later discussion, and it might reveal a certain amount of progressive coherency in the treatment of its topics. The order of topics might be varied in many ways, but in each case, to be considered *logical*, the progressively coherent quality should be evident.

General-science course may be logically coherent. — The same points apply in the logical organization of reconstructed courses in high-school mathematics or science. In the latter case certain practical issues could furnish the starting points, and material relevant to them could be drawn from various sciences. These practical issues and the selected scientific material would not necessarily be a hodgepodge, however. The issues themselves could be arranged in such a manner as to present just as attractive an example of progressive coherency as any of the abstract outlines of a single science. Hence a general course may be just as logical from this point of view as a course in physiography or botany or physics.

"Logical" may designate qualities of scientific thinking. — There is another way of thinking of the meaning of *logical*, however, and that is in terms of the kind of thinking that the student does. From this point of view a student who memorizes completely the attractively organized and coherent system of some textbook in chemistry or of a Euclidean geometry may not have done any logical reflective thinking at all. He may have no appreciation or understanding even of the steps of connectedness in the system that he has learned. On the other hand, a student who is presented with certain problems concerning ventilation or food supply, for example, and has to search for relevant material from various sources, may be doing the highest grade of logical reflective thinking. If he keeps his problem clearly in mind, if he searches for evidence, if he evaluates this in an unbiased manner, if he rejects irrelevant material, if he arranges and organizes his ideas, if he formulates and verifies his conclusions, he is being logical in the highest sense; he is becoming scientific-minded,

he is acquiring skill in the use of the scientific method, and he is on the right road to become a scientist.

Reconstructed courses may be logical in both senses. — Thus we see that whether the term *logical* be interpreted as designating the quality of progressive coherency in the teacher's outline of a course of study or as designating the quality of the thinking done by the pupil, in either case the work in reconstructed mathematics or in first-year general science may be essentially logical in character.

The general principles of organization which have been discussed with special reference to first-year mathematics and science apply also in many other subjects and at many stages in school work. For example, in the study of physics we have many of the same possibilities that were utilized in the outlines on general science. In domestic science it is probably desirable to begin with the study of practical issues in cooking and sanitation, and then to bring in from the various sciences the principles and experiments which have direct bearing upon these issues. This is necessary in order to avoid the waste of time in the special sciences upon topics that have no bearing upon the practical field for which students are being trained. Similarly, courses in psychology for teachers should grow out of practical issues in teaching. If the opposite practice of beginning with psychology is followed, much time is wasted on topics that have little or no bearing upon teaching.

Conclusion of discussion of subject matter. — This will conclude our discussion of the selection and arrangement of the material of high-school subjects. The four main points that have been treated in this connection are : (1) subject matter should be adapted to varying social needs ; (2) specific and relative values of topics should be carefully determined ; (3) in the content subjects the intensive treatment of a few large topics should be substituted for the encyclopedic treatment of many small topics ; (4) the order of topics should be determined by the needs, capacities, and interests of the students.

Up to this point in the book our discussion has been concerned with three large issues: *first*, the purposes of classroom activity, namely, health, information, habits, ideals, and interests as related to the development of efficiency, good will, and harmless enjoyment; *second*, economy in class management; *third*, the selection and arrangement of subject matter. These are fundamental preliminary issues that should determine the point of view of every teacher and that are of practical importance in connection with every subject.

The next problem to be attacked is how students learn most economically in the various subjects of instruction; for example, how do they acquire most economically motor skill, the vocabulary of a foreign language, skill in reflective thinking, habits of enjoyment, and skill in expression. Several chapters will be devoted to these problems of economy in learning.

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CHAPTER V

TYPES OF LEARNING INVOLVED IN HIGH-SCHOOL SUBJECTS

Main points of the chapter. 1. In order to choose the best methods of teaching various high-school subjects it is necessary to know the most economical and effective methods of carrying on the various types of learning involved.

2. For practical purposes the following types of learning may be distinguished:

a. Acquiring motor skill.
b. Associating symbols and meanings.
c. Acquiring skill in reflective thinking.
d. Acquiring habits of enjoyment.
e. Acquiring skill in expression.

Special methods in high-school subjects based on processes of learning.— In order to determine the correct methods of instruction to be followed in the various high-school subjects it is necessary to determine the most economical methods of learning which are involved in each subject. To do this will require taking up a consideration of several types of learning, since the processes of learning vary so much with the character of the subjects that are being studied. Up to this point in our discussion we have been concerned with certain *general* principles of method which are applicable in the teaching of nearly all subjects. These principles have been related to the purposes of high-school instruction, economy in classroom management, and the selection and arrangement of subject matter, and should concern all high-school teachers. Each of the next six chapters, on the other hand, will deal with certain *special* types or aspects of learning, and the teacher of only one subject, such as manual training or mathematics or composition, may be interested in only one or two of these chapters. This chapter is intended to serve as an introduction to these somewhat specialized discussions.

Five types, or aspects, of learning outlined. — For purposes of this discussion we may distinguish roughly five types of learning which are prominent in high school, as follows:

1. *Acquiring motor skill.* — This form of learning is obviously involved in gymnastics, dancing, manual training, and laboratory manipulation. It is less obvious, although really just as important, in learning the pronunciation of a foreign language and in learning to sing, since these involve acquiring motor skill in the use of the vocal organs.

2. *Associating symbols and meanings.* — This type of learning is most prominent in high-school in mastering the vocabulary of a foreign language. Since this constitutes such a large part of high-school work, the discussion of the most economical methods of building up associations is very important. The process of association is also prominent in such subjects as history, in which the learning of a series of facts forms a large part of the pupil's work.

3. *Reflective thinking.* — Mathematics, natural science, and the grammatical work in the study of a language involve a large amount of reflective thinking, reasoning, or problem-solving. Other subjects, however, may also provide for more or less of this type of mental activity. This is especially true of the social sciences, notably economics, civics, and sociology. Another phase of reflective thinking is the acquiring of abstract and general meanings, especially in the sciences and in mathematics and grammar.

4. *Acquiring habits of enjoyment.* — Music, literature, and other arts, as well as sports and games, furnish the best examples of this type of learning. In our discussion of the purposes of instruction (on page 17) we noticed that training for

harmless enjoyment constituted one of the ultimate aims of education. The special technique involved in instruction that is organized to attain this end will be discussed in Chapter X.

5. *Training in expression.*— This aspect, or type, of learning presents the central issue in oral and written composition, dramatization, drawing, painting, modeling, etc. It will be discussed in Chapter XI, with special emphasis upon training in composition.

By keeping in mind these five types of learning, and the importance of each in high-school instruction, the student will gain a general standpoint for studying the chapters that immediately follow. The first of these will be devoted to the first of the types of learning enumerated above, namely, acquiring motor skill.

EXERCISES

For problems for class discussion of Chapter V, see *Exercises for "Methods of Teaching in High Schools,"* p. E 55.

CHAPTER VI

ACQUIRING MOTOR CONTROL

Main points of the chapter. 1. Acquiring motor control is important in gymnastic and shop activities, in dancing, in musical technique, and in the pronunciation of a foreign language.

2. Psychological experiments upon motor control furnish few suggestions concerning methods of instruction, because they have ordinarily been conducted upon uninstructed learning.

3. There is a great mass of empirical discussion concerning the best methods of instruction to be used.

4. Practically the only point upon which there is agreement is the necessity of good form. There is often radical disagreement as to what good form is in any given case.

5. Studies in the anatomy and operation of the vocal apparatus in producing sound have led to an exaggerated emphasis upon instruction concerning the vocal movements in learning to sing and in learning to pronounce a foreign language.

Motor control important in various activities. — As stated in the preceding chapter, the acquisition of motor skill is the principal type of learning involved in gymnastic exercises, in dancing, in shop activities, in some laboratory exercises, in mastering certain forms of musical technique, and in the pronunciation of a foreign language. Typical examples in gymnastics are learning to swing Indian clubs, to fence, and to do the kip on the horizontal bar. In the laboratory and shop, learning to bend and blow glass, to dissect animals, to manipulate pie crust, to file iron, and to plane wood are examples. Acquiring skill in fingering in playing the piano or violin and learning to say *ich* or *böse* in German are examples from musical technique and the pronunciation of a foreign language respectively.

Questions of method involved. — In determining the best methods to be used in learning most economically and effectively to make the correct movements in these various activities the following special questions arise:

1. Are there certain best methods of performing a given act, to which the learner's attention should be directed?

2. (*a*) How useful are verbal directions or instructions concerning how to make the movements? (*b*) How useful is imitation?

3. Should the learner's attention be centered on the movement or on its objective result?

4. To what extent is it necessary to depend upon the method of trial and accidental success?

5. To what extent is it profitable to give separate attention to the learning of the elementary movements which constitute a complex act?

Experimental investigations have given little assistance. — These questions could easily be experimentally investigated in psychological laboratories, because the conditions of learning in the case of motor skill are relatively easy to determine and control. A scientific experimental investigation in any case aims to simplify, control, and modify in certain definite ways the conditions which determine a given event or series of events, and to measure exactly the effects of the modifications. In some types of learning (for example, in the case of acquiring skill in reflective thinking or in expression, or in acquiring habits of enjoyment) the processes of learning and the determining conditions are so complex that it is a difficult problem to control and measure them experimentally; but in the case of certain relatively simple acts of motor skill the experimental investigations are easily conducted, and a number have been made. Unfortunately, however, most of these have concerned undirected or uninstructed learning; that is, the learner has been left largely to himself to acquire skill in the act under investigation. Consequently, little light has been thrown upon the relative efficiency of various forms of instruction in modifying the learner's progress.

Learning to juggle balls a typical example of experimentation. — A good example of the investigation of learning to perform a complex act is E. J. Swift's work on the tossing and catching of balls. Five persons, technically known as "subjects," practiced for a good many days, and the results of the practice were definitely measured. Each subject juggled two balls; that is, he tried to keep both going with one hand, catching and throwing one while the other was in the air. There were three principal aspects or elements in the acquisition of skill in the performance: namely, (*a*) acquisition of general control in throwing; (*b*) sureness in catching; (*c*) use of some special method of throwing so as to avoid collisions.

If we consider Swift's experiment in terms of the general questions raised above on page 99, we may note the following points:

1. *Better methods of throwing and catching important.* — There are certainly *better* if not *best* methods of throwing and catching. For example, to avoid collisions, it is better to give the balls a circular motion, so that they go up on one line and come down on another. Moreover, of the possible circular motions it is better to use one from right to left instead of one in which the balls are thrown up at arm's length and take such a circular course as to fall close to the body. Hence a subject who hit upon the right-to-left or left-to-right circular movement early in the experiment made rapid progress. Likewise, in catching, it is better to let the ball fall into the palm held horizontally in front of the body than to catch it "with the hand high in the air and the palm forward and almost perpendicular," as was done by one of the subjects, with the result that he made relatively little improvement during the month that he used this second method.

2. *Verbal directions help in this case.* — The possibility of profiting by verbal instructions, supplemented perhaps

by imitation, seems perfectly evident in a case like this. Hence Swift makes the following statement:

> We see in this the value of suggesting good ways of doing things while the learning is still in its early stages. If the learner goes on [without instruction], he will finally develop a plan of his own, but only after a good deal of wandering, and even then it may not be the best. (**10**: 182)

3. *Attention sometimes on movement, sometimes on result.* — In some cases it would seem that the learner's attention might with advantage be centered on the movement, and in other cases on the objective result. For example, in the case of the poor method of catching described above, the substitution of the better method would seem to involve centering the attention on the movement or position of the hand. This does not mean that the subject would look at his hand, but its position would be kept clearly in mind in modifying the method. On the other hand, in the adoption of the right-to-left circular method of throwing, attention would almost certainly be centered on the objective result, namely, the path followed by the ball.

4. *Trial and accidental success used in finer adjustments.* — After full allowance is made for the possibilities of verbal instruction and imitation in assisting the learner to use the best methods, there remains a very large rôle to be played by the method of trial and accidental success. This becomes evident in the case of tossing and catching balls when attention is called to the large part played by the fingers and wrist in skillful juggling. The finer adjustments made by these parts do not come clearly to mind at any stage in the learning, yet they are most important in catching and throwing the ball skillfully.

5. *Separate training on elements not valuable here.* — There can be little question concerning the desirability or undesirability of giving separate training on each of the

elements which constitute the complex act in this case. By omitting catching for the time being, it would be possible to give separate attention to throwing, and vice versa; but it is doubtful whether anyone would advocate this. To be sure, efficiency in the act as a whole depends to a large extent upon efficiency in each part of the act. Hence an individual might throw well but his total efficiency remain low because he caught poorly. But since his catching is always to follow upon his throwing, it would seem best to strive to improve his catching *in connection* with the throwing instead of separately. Here the sequence is so intimate, or so certain, that separate mastery of one of the elements would seem to be uneconomical. There may be cases, however, which we shall discuss later, in which separate attention to the elements of a complex movement may seem to be justified.

Other investigations illustrating trial and error. — In order to bring out more clearly the part played by the method of trial and accidental success in adult learning we shall study briefly two other examples from experimental psychology. The first is an experiment conducted by J. H. Bair on learning to move the ears, and the second is W. F. Dearborn's description of the acquisition of skill in mirror writing.

Learning to move the ears a good example. — Learning to move the ears is for most adults an almost entirely novel feat. It is learned by securing separate control of certain movements of the ears which may occur when certain general movements of the head muscles are made, including raising the brows. That is, the movement which it is desired to control is first made as a part of a general diffuse movement of the neighboring muscles, and gradually by a process of selection and elimination comes to be made by itself. The same process of selection from a more diffuse movement occurs in learning to alternate the ears, in learning to raise the brows without moving (or innervating) the ears, and in learning to raise one brow independently of the other.

Having idea of movement did not eliminate trial and error. — Bair experimented to determine whether passively experiencing the movement would enable one to make it. He stimulated the appropriate ear muscles of the subject with electricity, thus making these contract and move the ear. He found that, while this enabled the subject to identify the ear movement when he succeeded in making it by trial and accidental success, it did not enable him to produce the movement without going through the process of trial and accidental success. Subjects who had experienced the electrically stimulated movement, however, took less time in learning to move the ears voluntarily than did a group of subjects who had not had the muscle stimulated electrically.

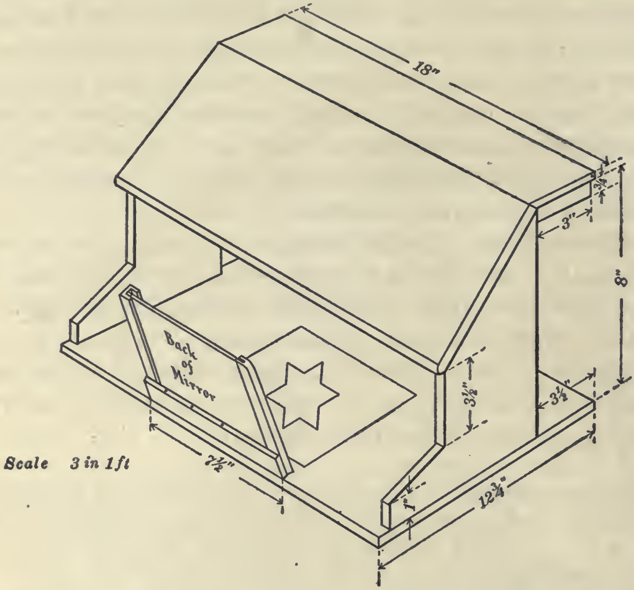
Concerning the direction of attention during the process of selection and elimination (for example, in learning to move one ear without moving the other) Bair says that a positive effort to inhibit the movement of one ear is not effective, but if the subject concentrates attention on the one to be moved and *forgets* the other, he gradually gains the separate control. Hence he concludes:

> The more closely the attention can be directed to a movement to be made, and the more nearly the part of the movement desired not to be made can for the time being be forgotten, the more likely is the desired movement to be accomplished. (**4**: 487)

This point is brought out more clearly in the following quotation from Freeman:

> The elimination of useless movements, or the selection of appropriate ones, is one of the fundamental processes in motor learning. A practical question which may be raised concerning it is whether the result can best be reached by emphasizing the movements which are to be selected or those which are to be eliminated. In general it is much better to fix attention on the movements which are to be made, and allow the superfluous movements to drop out of themselves. It is a familiar fact that the bicycle rider avoids

the ditch best by keeping his attention on the path. The nervous energy is automatically withdrawn from the channels leading to the muscles not concerned, when the nervous channels to the appropriate muscles become more open. Directions should be positive, then, rather than negative. The pupil should be shown what to do rather than what not to do. The only exception to this rule appears when the pupil has fallen into bad habits which need to be broken up. Then it may be necessary to call attention to the thing to be avoided. (**16**: 25)

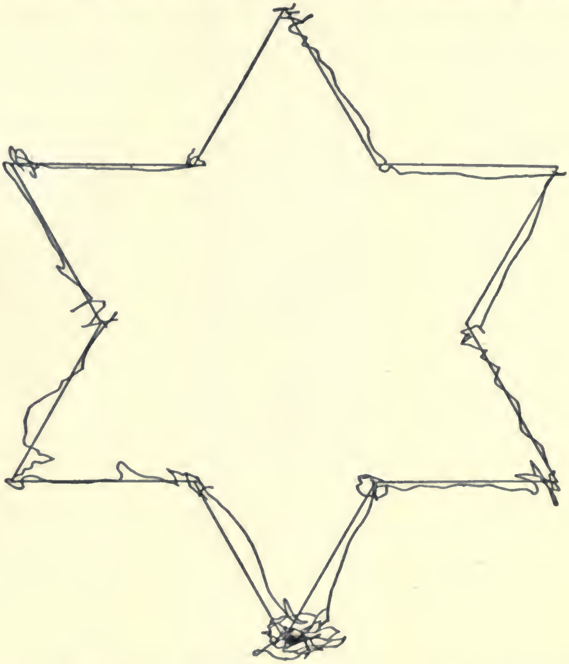


APPARATUS USED BY DEARBORN FOR EXPERIMENTING UPON MIRROR WRITING

Trial and error, not reasoning, predominant in mirror writing. — Dearborn's experiments on the acquisition by adults of skill in mirror writing illustrate clearly the part played by trial and accidental success but do not throw much light on the relative efficiency of methods of instruction.

The apparatus used by Dearborn is shown in the illustration on page 104. In discussing the experiment he says:

> There is some advantage . . . in an experiment which will indicate that the trial-and-error method is in certain conditions regularly employed even in adult human learning. The student is apt to get the impression from the usual discussion that trial and error, as a method of learning, is confined in its use to animals and children.
>
> In the experiment suggested the subject is directed to trace out the figure of a star by means of its image as seen in a mirror. The figure itself and the hand and arm employed are concealed

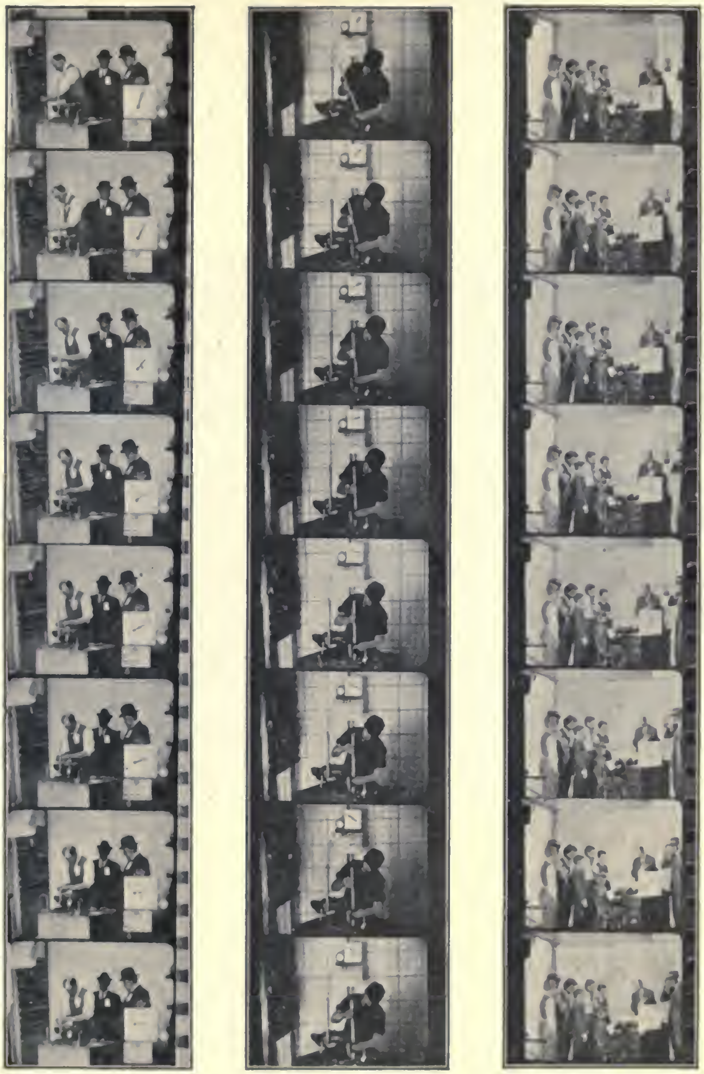


RESULTS OF EFFORTS OF ONE SUBJECT TO TRACE A STAR WHILE WATCHING THE REFLECTION OF THE STAR AND OF HIS HAND IN A MIRROR

Note his difficulties in getting away from the lowest point. After Dearborn from direct view by means of a simple screen, as shown in the illustration on page 104, and all visual guidance is secured solely from the reflection in the upright mirror. In such a test as this there is disturbance of the usual relation of visual and motor factors, which has to be adjusted. To one familiar with the principles of the mirror (and theoretically we all are) the problem is one which might very well be reasoned out. . . . The natural reaction is, however, not to reason much about it, but to make actual trial of it from the start. Typical results of such a trial are indicated in the illustration on page 105. (**5**: 375–377)

The possible influence of theoretical instruction in a similar experiment is shown by Judd in a report on the results of shooting at a target under water. Two groups of boys carried on the experiment. One group had been instructed concerning the apparent displacement of the object through refraction, and the other group had not. When the position of the object was changed by varying the amount of water, the boys who had been instructed concerning the effect of the water were able to make better records in shooting at it than were the boys who had not been so instructed. (**6**: 36–37)

Kinetoscopic pictures of movements used in instruction. — Up to this point we have considered the results of psychological experiments in which (with the exception of the last one described) little attention has been devoted to the modifications which would be effected in natural or untutored motor learning by the use of instructions. At the opposite extreme we have the recent activities of Frank B. Gilbreth, who, in his new "Motion Study," would provide the learner or worker with an elaborate analysis of his movements and with suggestions for improving his efficiency. The analysis and suggestions are to be based on kinetoscopic, or moving-picture, photographs of the subject's movements. The accompanying photographs suggest some of the essential ideas in the scheme. The kinetoscopic picture reveals in detail all



KINETOSCOPIC PICTURES USED IN GILBRETH'S MOTION STUDY TO INCREASE SKILL OF ARTISANS

In the left-hand picture note the movement of the workman which consumed about one second by the large clock the movements made by the subject. Those which are effective and valuable can be distinguished from those that are ineffective and useless by an examination of the moving picture when thrown on a screen. The large clock shown on the films in the picture has a single hand which revolves once in six seconds. By this means it is possible to calculate just how much time is wasted in useless movements. The results of a careful analysis of even so skillful and delicate an art as surgery show that a great improvement could be effected in the operations by eliminating waste motion. (**7**: 48–50)

Empirical discussions in gymnastics, music, and pronunciations. — Leaving these experimental studies of the acquisition of motor skill, let us consider the methods and practices which are found in the various school subjects in which motor skill plays a part. Here we shall find much empirical discussion but few scientific data.

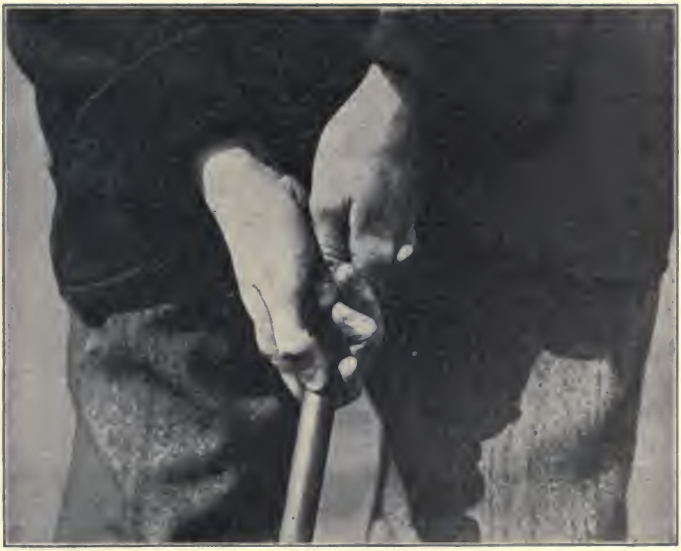
Gymnastics. — Taking up gymnastics, athletics, sports, and games first, we find the following points, in terms of our discussion on page 99.

1. *Good form is emphasized.* — Great stress is placed upon using what are considered to be the *best methods* of performing the acts in question. This is known as emphasizing good form. In football, for example, there are considered to be certain better or best ways of falling upon the ball, of carrying it, of tackling a runner, etc. Similarly, in golf, in tennis, and on the track, while certain mediocre or fairly good results may be achieved by various methods, in order to compete with the most expert it is necessary to use the methods that will direct and conserve energy in the most effective and economical ways.

2. *Verbal directions by coach supplement imitation.* — While the skilled coach or instructor may often depend upon imitation, he also makes extensive use of verbal instructions and directions which help the learner to analyze the movement or play and to "get the idea." This is brought out very strikingly in the occasional failure of the brilliant,

skilled, conscientious player when he tries to be a coach, and the occasional brilliant success of a coach who is not himself a skilled player.

3. *Explicit analysis of movements sometimes helpful.*— Such an analysis as is referred to in the preceding paragraph often involves explicit attention to the character of the movement to be made. An example of this fact is furnished by my own experience in learning to do the kip, or "snap-up," on the horizontal bar. This trick consists in hanging by the hands from the bar, swinging back and forth, and then, when the body has reached the end of the forward swing, kicking up at an angle of about 90 degrees to the direction of the trunk of the body. The performer's body then "snaps up" under and behind the bar so that he rests in a vertical



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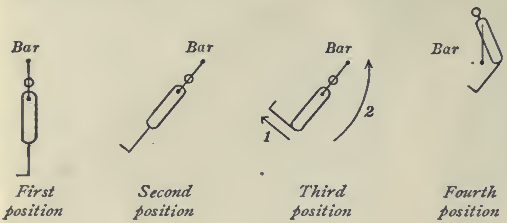
JERRY TRAVERS'S HOLD FOR PUTTING IN PLAYING GOLF

Note the peculiar interlocking of the little finger of one hand with the index finger of the other position with the bar across the front of his body near the hips. The diagram below represents the stages in the trick.

It commonly takes students from a month to six months to learn this trick. Some never succeed in learning it. My first instructor depended entirely on imitation and signals. He would perform the trick, then ask the students to try, and we would proceed to jerk our arms, kick, and thrash around in a more or less aimless way. Sometimes he would say, "Kick when I slap you." This signal helped a few of the students, but most of us continued to flounder. After a time another instructor took us in hand. He showed us the trick and *explained it*. He said, "You do not need to jerk your arms out of their sockets. No great strength is required. The whole trick is to kick at the right time and in the right direction. Watch the kick." These general remarks were supplemented by specific suggestions such as "Wait longer before you kick. Kick more toward the ceiling." Having grasped the idea, many of the students proceeded to learn the trick after a relatively brief period of trial and accidental success. It is important to notice that in a case like this it is very difficult to get the idea merely through observation or imitation. For example, the ordinary beginner commonly overemphasizes the arm jerk and fails to observe the importance of the kick.



STAGES IN PERFORMING THE KIP ON A HORIZONTAL BAR

In the third position 1 indicates the direction of the kick, and 2 the direction in which the body moves after the kick

4. *Trial and error.* — Further comment on the part played by trial and accidental success in gymnastic instruction is not

necessary, since the points made would be the same as in the case of tossing balls described above on page 101.

5. *Training in elementary movements sometimes helpful.* — Separate drill on the most elementary movements is sometimes emphasized in gymnastic systems which are constructed on the principle of proceeding from the simple to the complex. This separate exercise of elementary movements may be desirable from the standpoint of systematic training of all sets of muscles, and in acquiring various elementary coördinations which may then play a part in more complex coördinations. Swinging Indian clubs furnishes good examples. On the other hand, in many cases, such as the juggling of balls described above, separate practice on the elements is probably a waste of time. In some cases it is almost impossible, as in turning a back somersault in the air. In this trick the following movements are involved: (*a*) jumping vertically, (*b*) jerking the knees up so that they strike the chest, (*c*) swinging the arms back over the head, and (*d*) jerking the head back. The turn in the air is caused by (*b*), (*c*), and (*d*). While there may be some advantage in separate practice of each of these to develop strength, there is little advantage from the standpoint of developing control or coördination.

Musical technique. — In the acquisition of motor control in musical technique, as in playing the violin or piano or in singing, we find the following points:

Disagreements concerning good form. — There is strong emphasis upon correct method, or good form, although considerable disagreement may exist as to what is correct. Thus, one teacher may insist that his positions are the only correct ones to assume, while another teacher may claim that the first one ruins his pupils' chances by requiring such positions. Among the more moderate discussions we find such recommendations as the following, which occurs in Josef Hofmann's book entitled "Piano Playing."

> *Play always with the fingers*, that is, move your arms as little as possible and hold them and the shoulder muscles quite loosely. The hands should be nearly horizontal, with a slight inclination from the elbows toward the keys. Bend the fingers gently and endeavor to touch the keys in their centers and with the tips of the fingers. (**11**: 27)

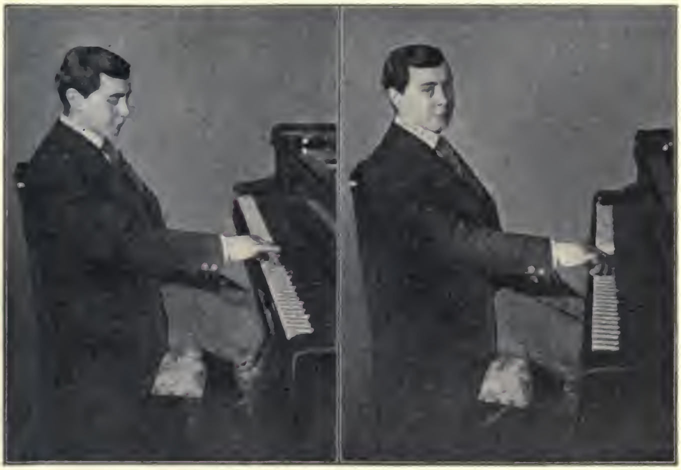
In the chapter on Correct Touch and Technique he says:

> A correct fingering is one which permits the longest natural sequel of fingers to be used without a break. By earnest thinking every player can contrive the fingering that will prove most convenient to him. But, admitting that the great diversity of hands prohibits a universal fingering, all the varieties of fingering ought to be based upon the principle of a natural sequel. (**11**: 35)

Attention to tones versus attention to movements illustrated in vocal technique. — In acquiring musical technique the learner's attention is very often directed by his instructor upon the movement itself, although the objective results (the tone or tones) are also emphasized in some systems. One of the best summaries of the historical and scientific aspects of the problem here presented, as far as voice training is concerned, is D. C. Taylor's "Psychology of Singing." The author contrasts (*a*) what he calls the mechanical methods (which focus the attention of the learner on his vocal apparatus) with (*b*) those which place the emphasis on the quality of the tone produced and the use of imitation and trial and accidental success. In this connection he quotes the following contrast between the two systems, written by an author who favors the mechanical method.

> If a teacher says, "That tone is harsh; sing more sweetly," he has given no method to his pupil. He has asked the scholar to change his tone, but has not shown him how to do it. If, on the other hand, he directs the pupil to keep back the pressure of the breath or to change the location of the tone, — if he instructs him in the correct use of the vocal chords or speaks of the position of his tongue, of his diaphragm, of his mouth, etc., — he gives him

method. The Italian teachers of the early period of this art had so little method that it can hardly be said to have existed with them. In fact, the word *method* as now used [in music] is of comparatively modern origin. The founders of the art of singing aimed at results directly; the manner of using the vocal apparatus for the purpose of reaching these results troubled them comparatively little. The old Italian teacher took the voice as he found it. He began with the simplest and easiest work, and trusted to patient and long-continued practice to develop the vocal apparatus. In all this there is no method as we understand the term. The result is aimed at directly; the manner of getting it is not known. There is no conscious control of the vocal apparatus for the purpose of effecting a certain result. (**12**: 316–317)



INCORRECT POSITION CORRECT POSITION

Positions of little finger illustrated by Josef Hofmann in his book entitled "Piano Playing"

In commenting on this quotation Taylor says:

This sums up beautifully the external aspects of the old Italian method, and of modern [mechanical] methods as well. . . . But it is a mistake to say that the old masters followed no systematized plan of instruction. . . . [They understood thoroughly] the meaning of methodical instruction. . . . The only important difference between the old and the new systems is this: [the old] one relied on instinctive and imitative processes for imparting the correct vocal action; the other seeks to accomplish the same result through the mechanical management of the vocal organs. In this regard the advantage is all on the side of the old Italian method. (**12**: 317–318)

Students who are especially interested in vocal training should read Taylor's entire discussion.

Disagreement concerning emphasis on separate training of elementary movements. — In musical instruction intensive study is commonly given to the elementary movements (fingering, vocal gymnastics, etc.) apart from their appearance in complex compositions. On the other hand, many instructors object to the extremes to which this practice is often carried. Further discussion of this point will be given in a later chapter, in connection with the topic of practice, or drill.

Learning pronunciation of a foreign language. — As a final example of acquiring motor skill we shall consider the current practices in learning the pronunciation of a foreign language. As far as instruction in American high schools is concerned, this topic has received relatively little consideration, inasmuch as many of the teachers do not speak the language well and many of those who do speak it have not given any consideration to the problems of teaching pronunciation. In Europe, however, owing to the more common use of a foreign language and to the better-trained teachers in some of the countries, considerable attention has been devoted to the problem of training in pronunciation. The resulting systems, or methods of instruction, are becoming known and copied in America. The best bibliographies of the American material with which I am familiar are in Handschin (**15**: 140–149) and Bahlsen (**14**: 39–41). The chief problem of method concerns the value of *phonetic* instruction in learning to speak the language.

Description of phonetic schemes. — The more elaborate schemes of phonetic instruction in pronunciation provide the following: (*a*) Information concerning the anatomy of the organs of speech and descriptions of the way in which the lungs, larynx, vocal chords, uvula, palate, tongue, nose, teeth, and lips operate in producing sounds. (*b*) A list, or series, of the elementary sounds of the language. (*c*) A system of phonetic transcription to represent these sounds. These systems consist of the ordinary alphabet with diacritical markings plus new symbols to represent sounds which cannot be satisfactorily represented by the conventional symbols. (*d*) Training in pronouncing the elementary sounds correctly by making extensive use of the material described under (*a*), (*b*), and (*c*).

Phonetic movement connected historically with other movements. — The great interest which such instruction has aroused in Germany is partially explained by its connection with several other movements, among which are the following: (*a*) The investigations of physiologists and physicists concerning the production of sound. The works of the Scotch-American A. M. Bell (1819–1905) (not the inventor of the telephone) and of Helmholtz (1821–1894), the great German physicist, anatomist, and physiologist, are especially noteworthy in this connection. (*b*) The desires of certain linguistic specialists and societies to secure a more uniform pronunciation of the native and foreign languages, free from the peculiarities of dialect. (*c*) The introduction of more vital, direct, conversational, practical forms of instruction in learning a foreign language, in place of the ordinary grammar-translation method. (This movement will be discussed in detail in the next chapter.)

Value of phonetics distinguished from merits of other movements. — It is important to distinguish between (*a*) the momentum which the phonetic method has acquired through its association with these other movements and (*b*) its real merit as an aid in teaching the pronunciation of a foreign language. There is no necessary connection between (*a*) and (*b*).

The facts discovered by the physicists and physiologists concerning the production of sound do not necessarily constitute the best basis for teaching a normal person to speak. The process of learning pronunciation is a psychological process, not a physical or physiological one; hence data from psychology, not from physics or physiology, furnish the scientific basis for teaching pronunciation. Moreover, the desirability of a more uniform national pronunciation does not prove that phonetic instruction provides the most economical and effective method of learning pronunciation; nor does the superiority of the oral, direct, objective, active method of teaching a language over the grammar-translation method prove the superiority of the phonetic method of teaching pronunciation.

Any direct training in pronunciation superior to former neglect. — Another point to be kept in mind is that *any* system of instruction which devotes special attention to correct pronunciation will secure better results than one that does not. Most of the older systems of language instruction did not aim at correct pronunciation; hence it was not secured. But if an instructor who can pronounce correctly himself works conscientiously for correct pronunciation by his pupils, he may secure it without elaborate phonetic machinery, just as the old Italian school of voice instruction secured superior results without the aid of modern physics and physiology.

Only moderate use of phonetics justified in America. — The arguments for and against the phonetic method are presented at length by Bahlsen (**14**: 41–49), with certain conclusions from his own experience concerning the modified use of it. Certainly from the standpoint of acquiring a practical working pronunciation of a foreign language the amount of machinery that has been developed for phonetic instruction seems entirely too elaborate. The following conclusion by Bagster-Collins, in his discussion of the teaching of German, probably provides sufficiently for phonetic instruction as an aid in learning pronunciation in American high schools.

Imitation of the teacher, though not alone sufficient to insure a proper pronunciation, is the most important means, and whenever imitation fails to bring about the desired result, practical explanation of how the troublesome sounds are made must come to its aid. A teacher will undoubtedly, by his study of phonetics, acquire a knowledge of the usual systems of phonetic transcriptions, and benefit his pronunciation thereby; but any extended use of phonetic texts in elementary work in the study of German in America is uncalled-for. I would not imply, however, that I do not attach great importance to the accurate teaching of pronunciation, or that I think that even a satisfactory pronunciation of German is easily acquired. It requires, on the contrary, great care and patience from the first to the last day of the course. The foundation must be well laid in the first year, (in fact, the first few weeks of the first year are critical), and what is learned then must be kept up to the mark, improved wherever possible, through untiring vigilance on the part of the teacher, if poorer work is not to be found in the upper than in the lower classes. (**13** : 49)

Example of simplified phonetic scheme. — An interesting example of a simplified scheme for phonetic instruction in German is the one used by Miss Lydia Schmidt in The University of Chicago High School. Miss Schmidt studied for a year in Berlin under one of the best teachers of phonetics. The scheme of phonetic instruction used included all of the elements described above on page 115. After several years of experience Miss Schmidt decided that much of the so-called scientific, theoretical instruction accompanying the phonetic training in pronunciation was a waste of time, and that a simple introduction based largely on imitation of the teacher was quite sufficient. She wrote to her former instructor in Berlin and found that the latter had also concluded that all of the necessary instruction could be given in a much simpler form and in ten practical lessons. Miss Schmidt's own scheme includes only five fundamental lessons, based on two pages of mimeographed lists of words, of which a few samples are printed below.

DIE DEUTSCHEN LANGEN UND KURZEN VOKALE

ā Vater, kam, fragen, haben, schlafen, Hahn, Knabe, Samen, nahm.
ă fand, Land, krank, Tante, Hand, Arm, Mann, Hammer, Lampe, Garten.
ē geben, legen, leben, streben, beten, jener, treten. . . .

DIE DIPHTHONGE

au Haus, Maus, laufen, Trauben.
ei weiss, heissen, bleiben, Weile. . . .

KNACKGERAUSCH (GLOTTAL CATCH)

Anna, Otto, ach, Anfang, Esel, eben, Ochs, offen, Indien, Ufer, Erich, Igel, Immensee, essen, Onkel, Eule, unser. . . .

The complete list contains about 250 words which are used to illustrate some forty sounds. After the introductory lessons are completed, attention is constantly given to securing correct pronunciation during the later work, as recommended above by Bagster-Collins.

Tentative answers to questions of method on page 99. — This will conclude our discussion of the methods of instruction to be used in acquiring motor control. Many of the problems of method involved are covered by the questions which we formulated in the beginning of the chapter (p. 99). As a summary of the points brought out in the chapter in discussing the special subjects of instruction which involve motor skill, we may formulate the following tentative answers to these questions.

1. In most cases of motor skill there are certain *better* methods of performance which use human energy or force more economically and effectively than others. The better methods are known as good form. In many cases, however, good form includes a number of possible methods and permits of considerable variation to provide for individual differences. Fingering in playing the piano is a good example.

2. Imitation of a correct model is generally the most effective way of getting the idea of the act to be performed. In some cases it is helpful to provide verbal directions concerning the best way to perform the act. There is great danger of overemphasizing such directions. Methods of teaching vocal technique and pronunciation furnish good examples of such overemphasis.

3. Ordinarily the learner's attention should be centered on the objective result of the movement, not on the moving organs. An elaborate analysis of the movements in terms of the anatomy and operation of the parts of the body concerned is generally a waste of time and often prevents the attaining of the best results. Musical technique and pronunciation furnish good examples. Occasionally explicit attention to the organs involved in the movement seems to be helpful.

4. The method of trial and accidental success necessarily plays a large part in motor learning. The process may sometimes be shortened considerably by suggesting to the learner the use of correct or better methods of performing the act. If these suggestions involve bringing over, or using, coördinations which have already been mastered in other situations, and which the learner can transfer voluntarily, the saving may be very great. If the suggested methods involve extensive new coördinations, however, the process of trial and error will still play a large part. There is danger of wasting time in piling up suggestions in order to shorten the process. Again musical technique and pronunciation furnish good examples.

5. As a rule, training upon elementary movements as they are encountered in complex acts or compositions is superior to isolated training upon the elementary movements. Frequently elementary difficulties encountered in complex performances may with advantage be studied separately for a short time and then worked back into the whole. A good example is separate training upon breathing out while the face is under water in learning to swim by the Australian crawl method.

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EXERCISES

For problems for class discussion of Chapter VI, with many practical examples of methods of teaching pronunciation of a foreign language and vocal control in singing and public speaking, see *Exercises for "Methods of Teaching in High Schools,"* pp. E 56–E 62.

CHAPTER VII

ASSOCIATING SYMBOLS AND MEANINGS: LEARNING A FOREIGN VOCABULARY

Main points of the chapter. — 1. One of the principal types of learning in the traditional high school is the association of symbols and meanings, especially in learning the vocabulary of a foreign language.

2. The ordinary translation method makes these associations indirectly via the English symbols; hence it is less economical than the direct method, which dispenses very largely with the use of the English symbols as intermediate links.

3. Ready-made systems of direct instruction are necessary for inexperienced teachers. Modifications of the Gouin series system are among the best.

4. According to this system the teacher is an active demonstrator of meanings before the class. He uses objects, actions, sketching on the blackboard, charts, and various other devices.

5. Systematic oral exercises are supplemented by easy reading and the gradual development of grammatical usage. The use of English is almost entirely eliminated.

6. All the conversational work must be definitely planned and systematized.

7. Pupils must be given ample opportunities to use the language in class.

Predominant process in foreign-language instruction. — In some aspects of high-school instruction the type of learning process most involved is the association of symbols and meanings. The most striking example is learning the vocabulary of a foreign language. The mental activity in this case consists largely in building up thousands of connections between English symbols and foreign symbols, or between meanings and foreign symbols. The high-school pupil possesses already a large stock of meanings associated with English symbols. The problem is to build up corresponding associations of these meanings with foreign symbols.

Example of associating "gargoyle" with its meaning. — An example of the process of establishing an association between a meaning and a symbol is the following: If I ask an undergraduate class in The University of Chicago if they know the meaning of *gargoyle*, most of them will say they do not. Yet many of the latter really have the meaning but do not have it connected with this symbol or name, for if I ask, "Have you ever noticed the strange ornamental figures, uncouth animals or men, on the cornices of some of the university buildings, particularly on the gate to the Hull biological laboratories?" many of the students will reply that they are very familar with them but did not know what they were. By this statement they usually mean that they did not know the name, or symbol, for them. They had the idea, or meaning, but not the conventional symbol for it. To be sure, this idea, or meaning, could be enriched or supplemented considerably by commenting on the fact that the gargoyles are one feature of the medieval type of architecture which the university has adopted; that they are said to have been used in the Middle Ages as a means of scaring away demons and warding off evil influences; and that the scientific spirit that dominates the biological laboratories which they adorn is the antithesis of the medieval superstitious spirit which they represent. We shall not be concerned here, however, with this process of enriching meanings, but shall concern ourselves simply with the methods of associating symbols with meanings that are already possessed by the students.

Examples of associating situations and responses. — The process of associating meanings and symbols is one example of the more general psychological process of associating situations and responses. When a person has made a certain response to a given situation and the response has been accompanied by satisfaction, the next time the same situation recurs the same response will tend to appear. The situation may be any kind of experience and the responses may be equally varied, including ideas, emotions, and actions. Thus, in response to the situation "being thirsty" one may think, "Where can I get a drink?" or say, "Please bring me a glass of water." Examples of the association of motor responses with situations were given in the preceding chapter. Thus, in tossing balls by the left-to-right circular motion, to the situation "ball tossed up" there occurs the habitual response "hand moved to left to catch the other." In the horizontal-bar example, to the situation "body at certain part of the forward swing" there occurs the response "kick."

Types of association in reading and speaking a foreign language. — In the case of learning the vocabulary of a foreign language the following two types of connections are made between situations and responses: In *reading* the foreign language the situations consist of the printed foreign symbols and the responses which are desired consist of the appropriate meanings; in *expressing* one's self in the foreign tongue the situations consist of meanings (that is, what one desires to say) and the desired responses consist of the appropriate spoken or written symbols. Hence we may describe the process of acquiring the vocabulary of a foreign language as building up mental connections between foreign symbols and meanings in *reading*, and building up mental connections between meanings and foreign symbols in *expression*.

Translation method forms associations indirectly via English symbol. — The ordinary method of teaching a foreign language by translation, proceeds to secure the associations between foreign symbols and meanings by a roundabout, or indirect, method, namely, via the English symbol. This method may be represented by the following diagrams:

Indirect method in reading

$$\begin{tikzcd}
\text{Foreign symbols} \arrow[dr] & & \text{Meaning (or idea)} \\
& \text{English symbols} \arrow[ur] &
\end{tikzcd}$$

Indirect method in expression

$$\begin{tikzcd}
\text{Meaning (or idea)} \arrow[dr] & & \text{Foreign symbols} \\
& \text{English symbols} \arrow[ur] &
\end{tikzcd}$$

Direct method dispenses largely with intermediate English link. — The direct method of teaching a foreign language, on the other hand, endeavors to dispense as far as possible with the use of the English symbols as intermediate links. It endeavors to establish directly the associations between the foreign symbols and their meanings. The processes may be represented by the following diagrams:

Direct method in reading

Foreign symbols → meaning

Direct method in expression

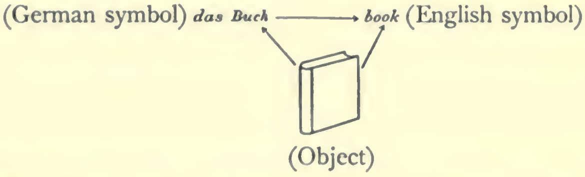
Meaning → foreign symbols

Both systems aim to develop ability to think in the foreign language. — The associations, or connections, represented in the diagrams of the direct method are the ones which we are interested in establishing ultimately in the student's mind in teaching him the language. The use of the English symbol as an intermediate step in the indirect method is considered, even by the users of this method, to be merely a temporary device for arriving at the more direct association. Both systems aim to enable the student eventually *to think* in German or French, or whatever the language may be, without recourse to the English symbols.

Direct method more economical than indirect. — The greater economy of the direct method as compared with the indirect becomes apparent when we consider both systems in terms of the process of association. When we compare the diagrams given above, it appears that *two* associations must be practiced or made by the indirect method for every *one* by the direct method. Even when the use of the English symbol as an intermediate link is only temporary, this is probably uneconomical. But when we consider that each time the indirect connection via the English symbol is made with resulting satisfaction the stronger becomes the chance that this connection will persist and be operative in the future, we see the immense waste that the translation, or indirect, method may entail, for it tends to enable the learner to read or express himself no faster than he can translate. This will certainly be much slower than the corresponding pace achieved by the direct method. Moreover, when we take into consideration the large amount of reconstruction in the order of words that is often necessitated in translating from one language into another, it would seem that the indirect method is even more wasteful than is suggested by the comparison in the preceding sentence.

Possibilities of indirect more obvious than of direct method. — One reason why the indirect, or translation, method is commonly used is because its possibilities are so obvious. It seems self-evident that the thing to do when presented with students who already have an elaborate system of associations of English symbols with meanings, is to proceed to utilize this system by coupling with it the corresponding foreign symbols. On the other hand, it is not easy to devise offhand a scheme of instruction that will build up directly the associations between meanings and foreign symbols that we want eventually to achieve. For one reason, our ordinary method of arousing a meaning in another person's mind is to use the language that he knows. If we are deprived of this means, we are at a loss to know what to do. In spite of this apparent difficulty it is possible to devise means of instruction which place the emphasis upon direct connections of the foreign symbols with meanings, and which necessitate only occasional recourse to the use of English symbols as intermediate links.

Direct connections easily established with objective experiences. — Opportunities for establishing these direct connections most easily are found in using objects and actions as points of departure. If a teacher holds up an object (for example, a book) and utters at the same time the German symbol (*das Buch*), a direct association is formed between the idea of the object and the German symbol. To be sure, other associations also occur, including possibly the connection of the object perceived with its English symbol (book), and the connection of the latter with the German symbol. The point to notice, however, is that the direct connection which we desire to establish (namely, between the thought of the object and the German symbol) has been started and emphasized. All of the associations which we have mentioned may be represented by the following diagram:



The possibilities of teaching foreign common nouns, and adjectives of form, size, and color, directly, by elaborations of the method suggested above, are numerous and obvious. In some of the European countries extensive sets of charts, pictures, lantern slides, and apparatus have been devised for this purpose.

Direct teaching of verbs emphasized in some systems. — Not only nouns and adjectives but verbs also may be readily taught by the direct method; in fact, the teaching of a series of verbs has certain advantages according to the advocates of some direct systems. The chief advantage claimed is that in a series of actions directed toward some definite end (for example, opening a door) there is a more or less necessary sequence. This sequence is easily grasped by the learner as a series of pictures, ideas, or meanings, and serves as a simple and definite basis for building up a corresponding series of foreign words, phrases, or sentences.

Some of the other parts of speech, such as prepositions of place and adverbs of manner, present no difficulties in direct teaching; but others, such as abstract nouns, do present certain difficulties. In a systematic course, however, these difficulties may be reduced to very small proportions, as will be seen later in the chapter.

Direct method requires much oral work. — Obviously, efficient instruction by a direct system requires much oral work by the teacher and oral practice by the pupils. Hence, the teacher must be skilled in speaking the language. Unfortunately many teachers of French or German in American high schools and colleges lack this essential qualification, although they may have a good reading knowledge of the language and understand its grammar thoroughly. Under these circumstances, probably the best they can do is to use the indirect, or translation, method to begin with. On the other hand, in many of our large high schools there are teachers who speak German or French fluently and are competent to use a direct system, but who often fail to do so because of ignorance of the possibilities.

Is oral presentation more effective than visual? — In addition to its advantage in providing direct associations between meanings and symbols, the oral method of teaching a foreign language might prove to be even more advantageous if material presented in oral forms would be retained better than material presented visually. Unfortunately the considerable number of experiments which have been conducted to determine the relative efficiency of various forms of presentation do not agree in their conclusions ; hence they do not furnish a guide for practice. (See **8**.)

Does mastery of pronunciation delay progress in reading? — Even if oral presentation were advantageous from the standpoint of retention, the reproduction by the student, which ordinarily accompanies it, involves in the case of the French language certain difficulties of pronunciation which might seem to offset the advantage. It could be argued that a bright, mature student might learn to *read* French fairly well in six months, but that it would take much longer if his training in reading had to wait upon a mastery of the difficulties of pronouncing. Hence it might be asked, Why delay the accomplishment of a relatively easy thing, namely, reading (which is all that is desired in many cases), in order to master a difficult process which is not essential to the purpose?

Further facts based on reliable measurements are needed before we can give a final answer to this question. These measurements should show (1) how long it takes an average class to secure a reading knowledge of French by the translation method, (2) how long it takes to get a fair mastery of pronunciation, (3) how long it takes a class which uses a direct method to acquire a reading knowledge. The answer commonly given by the advocates of the direct method is that " experience shows that superior results in grammar and reading are secured by the direct approach." Until more adequate evidence is presented, this position will be assumed to be true, and the following discussion will be based on this assumption.

A ready-made direct method needed for inexperienced teachers. — A skilled, experienced teacher may himself develop from the experiences of the pupils the material to be used in the direct method. Inasmuch as such teachers are rare in American high schools, however, and as much of the instruction is given by inexperienced, relatively untrained teachers, it is desirable to provide a ready-made direct system that the teacher can use as easily as a ready-made grammar-translation method. This is a phase of educational reform that is often overlooked by educational reformers. If they wish their reforms to secure much practical momentum, it is necessary to get them definitely organized in the form of textbooks or classroom materials that the relatively untrained teacher can use. The persistence of many relatively inferior methods and the vogue of many inferior fads and innovations are due largely to the fact that they have been definitized and commercialized in such a way that any teacher may easily take them up and put them into practice.

Modifications of the Gouin system among the best. — One of the best of the direct systems provides such a definite body of material for the teacher to use, but the method of using it makes it somewhat difficult to commercialize it profitably. This is the Gouin-series method. It consists primarily of sets of connected conversational exercises, which are carefully graded and organized so as to develop systematically the student's vocabulary, power of expression, and grammatical mastery of the language. Each lesson unit consists of a series of some fifteen to twenty-five sentences which describe or relate a connected series of events.

Example of a Gouin series.—The following is one of the first series that might be used in teaching English to foreigners:

I Go Out

I walk to the door.

I stretch out my arm.
I take hold of the knob.
I turn the knob.

I open the door.
I let go of the knob.
I walk out.

I turn around.
I stretch out my arm.
I take hold of the knob.
I pull the door.
I shut the door.

Teacher presents series orally with dramatization. — The teacher presents this series of sentences orally, broken up into the four parts as indicated. He parallels each sentence with the corresponding action and uses supplementary gestures to explain the meaning of individual words such as *I* and *door.* He aims first to impress clearly upon the minds of the students the series of events, actions, or pictures represented by the first four sentences. In order to do this he places special emphasis upon the series of verbs used. Having made each sentence clear by means of gestures, and having established the series of events in the minds of the pupils, he repeats the series of actions with the appropriate sentences three or four times, until the pupils have probably fixed them in mind.

He may then call upon one pupil to come before the class and simply go through the actions. He may then call on another pupil to go through the actions and give the appropriate verbs. He may then have a pupil go through the actions and repeat the corresponding sentences. The teacher then presents the next part of the lesson after the same fashion. Various modifications of this procedure may be introduced.

Subjects of other lessons or series. — Other lessons have the following subjects: I read a book. I walk. I go downstairs. I go upstairs. I wash my face. I shave myself. The cook boils some water. The maid sets the table. I seat myself at the table. I drink a cup of tea.

The following series is the first one taught in the instruction in elementary German at Miami University, Oxford, Ohio.

ICH LESE IN EINEM BUCH

Ich nehme ein Buch.
Ich nehme es in die rechte Hand.
Ich öffne es.

Ich wende die Seiten.
Ich suche die erste Seite.
Ich finde die erste Seite.
Ich lese den Titel.

Ich sehe das Bild an.
Ich blättere weiter.
Ich lese in dem Buch.

Ich mache das Buch zu.
Ich lege das Buch auf den Tisch.

Conversational Phrases

Können Sie lesen? Ja? Nein?
So weit. Ich danke Ihnen. Verstehen Sie das?
Wiederholen Sie das, bitte. Sie können gehen.

Imaginary as well as objective situations are used. — It is obvious that not all of the objects or actions involved in all of the series can be actually provided in the classroom. By means of description, gesture, and sketches, however, an imaginary situation is easily created, and the pupils fill in with some form of imagery the details that are not actually presented.

This is sufficient to suggest some of the possibilities of the Gouin method. Some of the series used in Europe can be used with little modification in America to teach German or French. Others need to be revised or varied to adapt them to American conditions, to local needs, and to the ages of the students.

Modifications of Gouin method from Frankfurt. — Bagster-Collins gives the following example of a freer adaptation of the series material as seen in Frankfurt, Germany, in the classes of Director Walter, one of the greatest advocates of the direct method. The German students were studying English.

> A boy was told to describe a trip to Marburg, à la Gouin. [He proceeded as follows:]
>
> 1. I go to the door.
> 2. I open the door.
> 3. I go out.
> 4. I go downstairs.
> 5. I walk across the hall.
> 6. I leave the house.
> 7. I am in the street.
> 8. I see a car passing.
> 9. I motion to the conductor.
> 10. The car stops.
>
> The catalogue of successive actions now gives place to conversation more natural in character. Another pupil acts the part of the conductor and asks how far he is going. (**4** : 82–83)

Another example of the modified Gouin method as used in Frankfurt is the following:

> As the teacher enters the room . . . the movements of the teacher are either described by individual pupils or by the class [as follows:]
>
> 1. You are entering the room.
> 2. You are stepping onto the platform.
> 3. You are pushing back your chair.
> 4. You are sitting down.
> 5. You are opening the inkstand.
> 6. You are taking the pen.
> 7. You are dipping it into the inkstand, etc. (**4** : 83)

Includes conversational phrases for class routine. — The Gouin method also includes series of sentences to be used in the ordinary routine of class work. For students who are learning English these include the following:

Pay attention.
Say the sentence.
Repeat the sentence.
Go ahead.
Good; very good.
I am very well pleased.
Is that enough?
No, not yet.
Yes, thank you.
Have you understood everything?

Occasions are arranged so that pupils will be required to use these. For example, one pupil calls on another and says, "Give the next sentence." After the sentence is given, another pupil may say, "Very good" or "I congratulate you" or "How well you repeat it." Each of these pupils is made responsible during a portion of the period for contributing some specific sentence to the conversation.

Printed sheets distributed after oral presentation. — These examples give some notion of the type of material used by the Gouin system and the method of using it. The difficulty of commercializing it is somewhat greater than in the case of a textbook method, inasmuch as the material is not placed in the hands of the students until it has been presented orally by the teacher. This necessitates having each lesson printed upon a separate sheet. These sheets are kept unbound. After the teacher has taught a given series (for example, the one on opening the door), the printed sheets of the lesson are distributed to the class. Each pupil copies it into a blank book at home, studies it, and returns it next day, when he is supposed to be able to recite it completely. Such a procedure usually necessitates the mimeographing or printing of the sets of lessons that are to be used in a given school. However, in view of the discussion given above on page 39, this is a step that should be taken if the superiority of the educational results is apparent.

Reference to history of Gouin method. — The teacher or prospective teacher of German or French who desires to begin to use an organized direct method should read the article by Professor C. H. Handschin of Miami University, Oxford, Ohio, which was published in the *School Review* for March, 1912, and is entitled "A Historical Sketch of the Gouin-Series System of Teaching Modern Languages and of its Use in the United States." After reading the article it would be well to write to its author for further assistance.

Another valuable source of suggestions for using direct methods is E. W. Bagster-Collins's excellent manual of method entitled "The Teaching of German in Secondary Schools" (**4**). The general suggestions offered in the book apply to the teaching of French as well.

Objective oral lessons primarily preparatory to reading. — Inasmuch as learning to read a foreign language is much more important for Americans than learning to speak it, the relation of direct oral methods to learning to read should be made clear. This relation is brought out by Bagster-Collins in the following quotations.

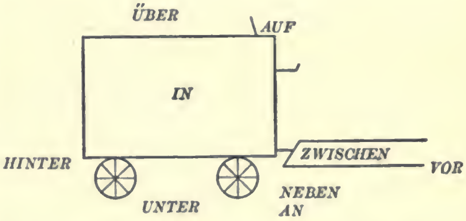
> In spite of the objections we have raised to making an oral command of the language anything more than a subordinate aim (compared with the general aim — reading), we must not forget that conversational exercises occupy an important place in modern language teaching, pedagogically considered; although not to be regarded as an end in themselves, they are an indispensable means to an end. Experience teaches us that a just proportion of time spent on oral exercises gives a firmer grasp of the grammar and vocabulary. (**4** : 23–24)

This relation of oral work in the foreign language to learning to read is brought out in the following quotation from Handschin's article.

This method does away with the use of the mother tongue in the classroom, and it gives *Sprachgefühl* [language feeling]. In the Miami adaptation of the Gouin method one hundred lessons (of from eighteen to twenty-five sentences each) in German, and one hundred and seventy-five in French, are taught. This number is considered sufficient to give *Sprachgefühl.* Here the plan differs from Gouin's in that his plan was to teach the entire vocabulary of the foreign language by means of the series before allowing the student to go on to literary study. In the Miami plan the reading of an easy text is begun about the second week. In the teaching of grammar Gouin is forsaken, and the grammar is taught inductively, many devices of the reform method being used, such as reproducing the lesson in various persons, numbers, and tenses, etc. After the principal forms have been taught inductively, a regular grammar is taken up little by little. In reading-texts, likewise, the reform textbooks are given the preference. The advanced work is conducted as in other schools, except that the foreign language is used almost exclusively in the classroom." (**6**: 174–175)

Systematic mastery of all phases of language provided. — This quotation suggests the gradual systematic mastery of the foreign language in all its aspects by beginning with a correct, direct, objective, oral approach. A small working vocabulary having been acquired in the first few weeks, reading is begun, but not translation. The reading being simple, it may be discussed and rehearsed in the foreign tongue. New words can often be explained by gesture, synonym, reference to the context, or discussion in the foreign language. Occasionally it will be necessary to give the English equivalent, but in such a case the foreign word immediately gets its setting or meaning in the foreign context, and the tendency to think of the English equivalent does not persist very long. Meanwhile the oral series lessons are continued and correct grammatical *usage* established. As the general grammatical terms become useful they are introduced in the foreign language. Very few general grammatical statements or rules will be necessary. At all stages of the work charts and objective devices of all sorts are used. One of these charts is shown below and is intended to teach the list of German prepositions (*an*, *auf*, *in*, *hinter*, *neben*, *vor*, *über*, *unter*, *zwischen*) which govern either the accusative or the dative. The meanings of the prepositions are suggested directly by their positions on the picture of the wagon (except for *neben* and *an*), and the device is helpful in providing a means of almost instant recall.

Grammatical usage established by the direct method. — The general principles of association upon which this chapter is based are further illustrated by the training in grammatical usage provided in the direct system of instruction. If we think of grammatical usage in terms of associations, it is clear that the associations that we desire to build up are associations between words *in sentences*. This is true in the case of all grammatical relations such as the relations between the forms of adjectives and nouns, the forms of verbs and subjects, etc. This being the case, it is evident that extensive training in actual use of the forms in their natural connections is much more important than the study of tabulated forms in connections which are unlike the associations that occur in the actual use of the language. An example of such specific training in grammatical usage in learning German is given by Bagster-Collins in the following words:



> The method will be largely oral. Instead of asking questions about grammar or being content with listening to the recitation of paradigms, we will talk grammar. That is to say, we will arrange a kind of conversation, rather oral exercise in the form of question and answer, of such a nature that the manner of the question will

force the pupil to employ the grammatical point which the teacher wishes to emphasize. For example, suppose one wishes to teach the weak declension of the adjective, more particularly one case — the accusative singular. For nouns let us take objects lying on the teacher's desk, things with [the German name of] which the pupils are very familiar, so that they can concentrate their attention on the one point to be learned. Our material, for the present, will be pencils of various colors, books, and chalk. It should be made clear to the class what the teacher wishes done. It is understood also that they are always to answer in complete sentences. If the class has learned the forms of the weak declension [which would have been taught gradually in the series material], the teacher can simply ask the first question; if not, of course, he will have to answer the first question himself in order to start the class.

Welchen Bleistift habe ich in der Hand?
Sie haben den roten Bleistift in der Hand.
Welchen Bleistift habe ich jetzt in der Hand?
Sie haben den blauen Bleistift in der Hand.
Was nehme ich jetzt in die Hand?
Sie nehmen die weiße Kreide in die Hand.
Fräulein M., nehmen sie die rote Kreide. Welche Kreide nimmt Fräulein M.?
Sie nimmt die rote Kreide.
Worauf lege ich jetzt das braune Buch?
Sie legen das braune Buch auf den Tisch (auf den großen Tisch, etc.). (**4**: 124–125)

Supplementary cautions. *Direct teacher must be active and alert.* — Finally, if teachers are going to use the direct method, it is important that they observe certain cautions which are not essentially related to the general point of this chapter but which it will be well to emphasize here. The first point to keep in mind is that the direct teacher is an active demonstrator of meanings. This means that during much of the instruction, especially during the first few months, he will be on his feet most of the time, active and alert, using all possible devices, including actions, objects, sketching on the blackboard, etc., to secure attention to the meanings. Under these circumstances a tall reading stand upon which to place the material to which he refers is much better than a desk. If he is teaching a Gouin series, even if he feels fairly sure that he has it memorized, it is well to have it on the stand for reference, for, as we shall see in the next chapter, it is important to repeat it exactly the same every time during its oral presentation, in order to avoid introducing interfering associations into the pupil's learning.

All conversational work must be definitely planned. — The other two cautions to which attention should be given can be quoted to advantage from Bagster-Collins. The first concerns definite planning. He says:

> In order to derive the greatest good from colloquial exercises, they should be clearly planned to do definite work. We talk with a purpose and not simply to hear our own voices. The work in speaking should at every turn be vitally connected with the other work of the class. It should not be regarded as something outside, or at the most loosely linked with the main system — a sort of relaxation from the study of grammar or translation. . . . We must ever reject colloquial exercises that lead to nothing — that are mere talk. Such work is unworthy of the school. The aimless, rambling conversations often met with in books on the so-called natural method are to be condemned. (**4** : 73–74)

Students must be given ample opportunity to talk. — The final caution is the following:

> After all, one of the great secrets of doing successful work in conversation is to stimulate the pupils to do the greater part of it. Let the teacher talk as much as is necessary to make what he wants to do clear; then let him see that the class does more talking than he does. (**4** : 74)

In order that the necessary opportunities for such responses on the part of students may be provided, it is important that the beginning language classes should be small. This is being well provided for in some good large high schools by limiting these classes to fifteen or twenty pupils. In the smaller high schools this matter would probably adjust itself.

Conclusion of discussion of forming associations. — This will conclude our discussion of the type of learning that involves primarily the associating of symbols and meanings. The acquiring of a foreign vocabulary has been treated at considerable length as an example of this type, because of the large practical importance of the issues involved. Other examples of the general process of association as carried on in school may be found in Thorndike's "Principles of Teaching," pp. 112–123.

The two types of learning which we have considered so far are (1) acquiring motor control and (2) associating symbols and meanings. In each case we have been concerned with the best methods of *starting* correct associations. There remains the problem of determining the best methods of making these correct associations *permanent*. This problem will be discussed in the next chapter, under the title of Practice or Drill.

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9. TALBOT, W. Teaching English to Aliens. *Bulletin No. 39*, *United States Bureau of Education*, 1917. Contains bibliographies of textbooks etc.

Additional references. — For important additions to this bibliography, see *Exercises for "Methods of Teaching in High Schools,"* pp. E 69–E 70.

EXERCISES

For problems for class discussion of Chapter VII, with several additional examples of direct methods of teaching foreign languages, see *Exercises for "Methods of Teaching in High Schools,"* pp. E 63–E 69.

For the assignment of a paper based on an examination of periodicals dealing with the teaching of special subjects, see pp. E 71–E 72 of the *Exercises*.

CHAPTER VIII

PRACTICE OR DRILL

AUTOMATIZING MOTOR AND MENTAL ASSOCIATIONS

Main points of the chapter. — 1. After associations have been correctly started, they should be made automatic by effective economical practice.

2. Feelings of satisfaction or success and attitudes of zeal and concentration of attention are essential or especially helpful in this process.

3. In memorizing, the method of correct recall is helpful because it involves concentration of attention.

4. Experiments upon memorizing by "wholes" or by "parts" have failed to show conclusively which is better. Sometimes one and sometimes the other appears better.

5. Time should not be wasted on accessory processes, such as thumbing dictionaries and copying problems, but should be concentrated on the real processes which are to be automatized.

6. It is probably more economical and effective to distribute periods of practice and repetitions in memorizing than it is to make them relatively continuous.

Automatizing should follow correct start. — The two preceding chapters discussed methods of learning to make correct connections, or associations, in acquiring motor skill and associating symbols and meanings. In each of these cases it is important to make a correct start. Thus, in learning to toss balls it is desirable to introduce as early as possible the right-to-left circular motion, and in learning a foreign language it is important to establish as directly as possible the connection between the foreign symbols and their meanings. In the present chapter we shall consider the problem of providing sufficient practice or drill to make connections, or associations, *automatic*, but it is important always to keep in mind the necessity of getting started right before this process of automatizing is emphasized.

Only correct practice makes perfect. — In discussing the use of the method of trial and accidental success by animals and children, Kirkpatrick calls attention to the importance of *correct* practice in the following words:

> It is not to be understood that the most economical mode of reaching favorable results is necessarily acquired before the reaction becomes established as a habit. If a series of movements has favorable results more quickly than any other series of movements that has been tried, it may become established as a habit, although it is far from the shortest and most economical mode of securing the result. It is not true, therefore, that practice necessarily makes perfect. Practice may just as readily establish an imperfect and uneconomical mode of reaching an end. This is an important principle to be recognized by teachers, who should be satisfied so long as a pupil is changing for the better in anything that he is doing, but should take care that he does not form a fixed habit before a reasonable degree of perfection has been attained. (**5**: 117)

Similarly, in his discussion of skill in typewriting, Book says:

> Great effort wrongly or carelessly applied is even more detrimental to progress than a simple lapse in attention or effort. . . . The tendency to slight the associations in the last stage of their development and to push ahead too fast can, of course, best be overcome, in typewriting, by not always practicing at maximum speed, for the effort for speed usually means that attention deserts the details of the work. To perfect carefully the elemental associations it will therefore be found better, practically, to practice most of the time for accuracy alone and only a small part of the time for speed — a custom generally followed by the best typewriting schools. (**12**: 179)

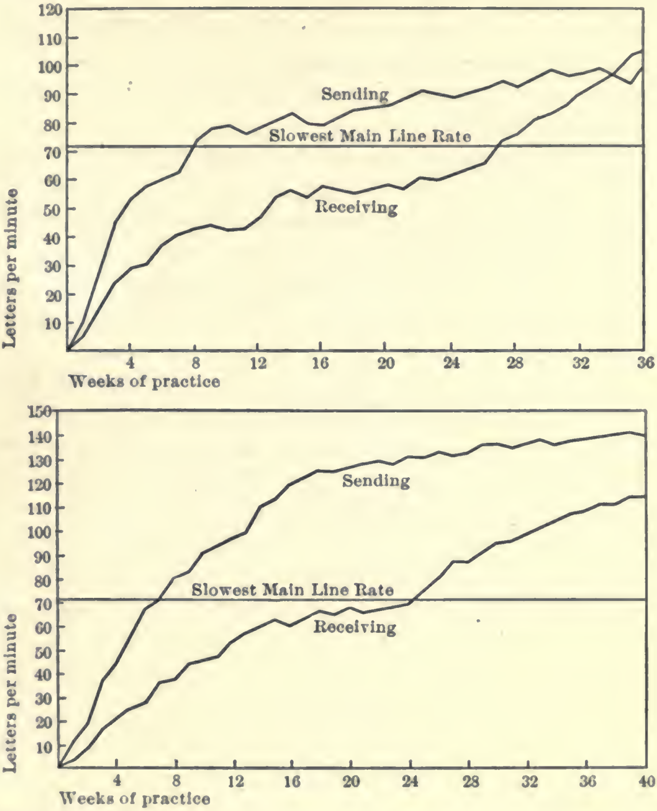
Examples of automatizing associations. — Having made sure that the correct connections are started, the next problem is to provide the best conditions for effective and economical automatizing of them. For example, if a student in high school is learning to write German script, after making sure that he knows the correct forms of the letters and can make them correctly when concentrating his attention upon them, it becomes necessary to provide sufficient practice so that he will be able to write them rapidly without much attention to them. In other words, the process of writing should be made so automatic that his attention may be concentrated upon the thought to be expressed, while his writing movements are executed automatically.

Similarly, in learning to read German the correct direct connections between symbols and meanings should be made so automatic that the reader does not have to stop and think in order to discover the meaning. Other examples occur in connection with memorizing. Thus, in a literature class, if a poem has been read and enjoyed, it may be desirable to fix it permanently in the pupils' minds for future use and enjoyment; and in physics and trigonometry, after the fundamental formulæ have been derived and are understood, it is often desirable to memorize them so that they may be recalled automatically whenever it is necessary to use them.

All of these examples are simple illustrations of the formulæ concerning habit formation which we paraphrased from James on page 31 in our discussion of economy in management, namely, make habitual as early as possible as many useful acts as possible, in order that the attention may be free to solve new problems as they present themselves. The pedagogical problem is to discover the most effective and economical forms of practice to be used in making acts or responses habitual or automatic.

Examples of experimental investigations. *Learning telegraphy.*— Considerable experimental work has been done by psychologists in studying the progress made by individuals during periods of practice. Historically the most interesting and best known of the studies made in America is one by

Bryan and Harter on "Learning the Telegraphic Language," published in the *Psychological Review* in 1897 (Vol. IV,



EFFECTS OF NINE MONTHS OF PRACTICE IN LEARNING TELEGRAPHY. TWO SUBJECTS

Note the plateau in the receiving curve of each subject. After Bryan and Harter, from Thorndike's "Educational Psychology"

pp. 27–53) and 1899 (Vol. VI, pp. 345–375). This study was based on testimony obtained from many telegraphers, including experts as well as beginners, and upon carefully measured tests of the progress made by students who were learning telegraphy. The improvement made by two of these students is represented in the curves shown in the illustration on page 145. A rise in the curves represents increase in speed for sending or receiving telegraphic messages, and movement from left to right represents increase in the number of weeks of practice.

In the curves which represent the ability to receive messages it appears that the learner made a rapid improvement for about fourteen weeks, then improved at a slower rate for about ten weeks, then improved more rapidly again. The periods of little improvement are known as "plateaus." Further reference to the results of this investigation will be made later in the chapter.

Acquiring skill in typewriting. — One of the most elaborate of the American studies of practice was made by W. F. Book on the acquisition of skill in typewriting. This was published in 1908 under the title "The Psychology of Skill" (**12**). It describes most minutely the progress made by several subjects in learning typewriting during a period of several months. The study is based on exact mechanical records of the amount written (which is measured to the minute) and upon other observations recorded by the subjects and the experimenter. The progress of the learners is shown by curves similar to those described for the Bryan and Harter investigation. In describing the curves, Book makes the following summary statement:

> (1) The curves belong to the usual type, that is, they rise rapidly at first [indicating rapid improvement] and then more and more slowly as an expert skill is approached. (2) There are as usual marked fluctuations in efficiency from minute to minute and day to day. . . . (3) All of the regular learning curves show a number of short, irregular periods of arrest — "breathing places," in their upward movement, [indicating little or no increase in efficiency and] lasting, in our experiment, from five to eight days. (4) Two of

the regular learning curves and all curves for the practice-sentence writing, show one or more longer periods of arrest — actual plateaus where no improvement is made for a period of from thirty-two to forty-eight days. (**12** : 167)

Neither of these investigations measures directly the relative efficiency of various methods of instruction in modifying the progress made by students, but the investigator in each case draws certain pedagogical conclusions which will be referred to later in the chapter.

Determining most economical methods of memorizing. — Experiments upon memorizing furnish another possible source for evidence concerning the most effective and economical methods to be used in connection with certain forms of practice and drill. In this field the work of a German investigator named Ebbinghaus has become classic. His monograph on memory was published in 1885 and has recently been republished in English (**15**). Ebbinghaus experimented with a new type of materials, namely, nonsense syllables (*gub*, *lil*, *los*, *mox*, *fas*, etc.), and determined a great many facts concerning the phenomena of memorizing. His work has been followed by a large number of other investigators, whose results are summarized and discussed at length by E. Meumann in his "Psychology of Learning" (1913), pp. 139–364, and E. L. Thorndike in his "Educational Psychology," Vol. II (1913).

Aspects of economical learning to be discussed. — The factors which determine the most effective and economical methods of automatizing associations will be discussed under the following heads: (1) Influence of feelings of satisfaction and dissatisfaction. (2) Part played by zeal and concentration of attention. (3) Use of correct recall in memorizing. (4) Memorizing by wholes. (5) Avoiding waste of time on accessories. (6) Most favorable distribution of periods of practice.

1. Influence of feelings of satisfaction and dissatisfaction is important. — The first of the factors that contribute to economy and effectiveness of practice which we shall consider, is the possibility of connecting feelings of satisfaction with successful practice and feelings of dissatisfaction with unsuccessful efforts. In general, responses or reactions which bring satisfaction or seem to be successful tend to be repeated, while other responses are gradually eliminated. As a rule, the greater the feeling of annoyance connected with an unsuccessful act, the less likely it is to be repeated. Hence Kirkpatrick says:

> It should be noted that habits are not formed merely because of performing and repeating an act in a certain way. Whether the tendency to repeat the act shall be greater or less is determined by the results of the act. If the results are favorable, the tendency to repeat the act is increased; but if the results are unfavorable, the act is either performed with less vigor or is replaced by some other act. When a cat jumps on a table and gets some food, the tendency to repeat that act is increased because of the favorable result; but if she performs the same movement of jumping on the table and gets a blow on the head, the tendency to jump on the table is decreased. (**5**: 113)

Pleasant feelings facilitate progress in typewriting.— Book, who made very elaborate records of his subjects' feelings and correlated these with the records of their efficiency in typewriting, makes the following statement in discussing "the retroactive effects of pleasant and unpleasant feelings upon the learner's ability to do and improve."

> Pleasant feelings had undeniably, in our experiments, a stimulating and helpful effect upon every part of the work; unpleasant feelings, a depressing, retarding effect.... Success brings pleasure, and the pleasure spurs the learner on to greater effort and more successful work. An unpleasant feeling tends to interrupt the natural, easy, and correct movement of attention by taking forcible possession of consciousness and dominating it. Instead of consciousness being focused on the details of the work, it is filled with unpleasant feelings, which not only take attention off the details of the work but create a "set" of mind unfavorable for the work. (**12**: 152)

2. Zeal and concentration of attention make practice effective. — Closely related to the influence of feelings of satisfaction and dissatisfaction discussed above is the influence of zeal and concentration of attention upon the efficiency of practice or drill. Book's experiments upon typewriting furnish us with the best evidence on this point. As noted in the brief quotation given above on page 146, the curves of learning for his subjects showed two types of periods during which there was little or no advance in efficiency. There were the short "breathing places" of a few days in length and the long plateaus varying from thirty-two to forty-eight days. Book explains the appearance of these periods of arrest largely on the basis of lack of attention and interest. His evidence for this position is scattered throughout his discussion; hence it is difficult to quote it. The following paragraph is a typical generalization.

> At the critical stages [plateaus] where a natural and marked decrease in spontaneous attention and effort occurred, no improvement was made. The learner was caught by the law of habit and was content to use old methods of writing when he should have been forging ahead inventing new and better ones. (**12**: 130)

Explanation of lapses in attention at some stages in learning. — As an explanation of the fact that, in his experiments, periods of no improvement were periods of little attention to the work, Book offers the following statement:

> In the early stages of learning, where many elementary associations were in their first stages of development, and where, consequently, many short cuts in method were possible and easy to make, no lapses in attention and effort occurred. The associations were in their first stages of development, where improvement was rapid and easy. . . . The strong incentives required for keeping attention focused on the work and forging ahead were furnished by the rapid progress and success.
>
> With the continuation of practice and gain in skill all this is changed. The elementary habits get further along in the course of

> their development, and, as attention naturally tends to drift away from every association or detail of the work as it becomes automatic, these associations soon lose their drawing power for it. . . . This fact, then, that attention tends naturally to drift away from every activity or special association as it becomes automatic, and drifts away from the work as a whole as progress becomes slow, is responsible for these longer lapses in spontaneous attention and effort. . . . The learner at these critical stages has need for incentives that make their appeal to spontaneous attention or natural interest. (**12**: 145–146)

Would steady, intense interest avoid plateaus in learning? — Plateaus, or places of no improvement, appear so commonly in curves of learning that it has sometimes been assumed that they constitute a necessary stage in acquiring skill in any complex performance. Book takes exception to this point of view, as far as learning typewriting is concerned, and maintains that if the necessary zeal and concentration of attention could prevail throughout the learning, the critical stages would be passed quickly without the development of plateaus. As evidence for this view he cites the

> fact that some of [his] *learners did of themselves successfully overcome the difficulties encountered at some of the critical stages* in learning to use the typewriter, and the further well-known fact that in learning such complicated things as playing the piano or learning a foreign language many learners successfully conquer the difficulties presented by every critical stage and thus eliminate the plateaus. (**12**: 160–161)

Interest and effective drill not opposites. — These extended quotations have been made from Book's study because it furnishes one of the best *measured* investigations of the importance of interest and zeal in learning. Ever since the time of Locke (1632–1704) and Rousseau (1712–1778) there have been strong arguments advanced in favor of interest as a factor in making learning more economical and effective. Although these arguments have been accepted by many educators, there are still many who think that school work should be characterized by "arbitrary memorization, drill, and habituation with little appeal to interest or understanding."

The alignment of interest and zeal among the chief aids or factors in effective drill stands in very sharp contrast with the two extreme positions concerning these aspects of school work. At one extreme we find the ultraconservative educators, who insist on drill as almost the beginning and end of instruction, but rule out interest. At the opposite extreme we find the ultraidealists, or radicals, who have no use for drill, but exalt interest. Neither theory is satisfactory in school practice, and Book's study shows why. Drill without interest is uneconomical; hence our old-time schools succeeded in accomplishing little with their methods of dreary grinding. On the other hand, drill is necessary — indeed, very many periods of drill — in order to make automatic some of the complicated forms of human behavior which are necessary for efficiency; but it need not and should not be divorced from interest.

Skilled teacher should provide interest at critical stages. — The pedagogical conclusions from this phase of his study are summarized by Book as follows:

> The critical stages are, in all probability, a stern reality in all forms of complex learning, but our facts seem to warrant the general statement that a skilled and sympathetic teacher — one who knows what habits are to be formed in the learning he is to direct, and who therefore knows where the critical stages appear — might so guide his learners that their attention would be kept properly applied to the details of the work. . . . He might also provide such emotional helps and artificial stimuli, by arousing an interest in the higher aspects of the subject, as would fully compensate for the natural lapses in interest and effort at the critical stages. If the learner's interest and effort can be kept from lagging and kept properly directed, there will be no plateaus. (**12**: 161)

Intense effort based on spontaneous interest is helpful. — Up to this point our discussion of Book's results has been concerned largely with the negative aspects, namely, that improvement was not made during periods of lack of attention or interest. On the positive side he found that rapid improvement was the result of intense effort. This effort, however, was not of the kind associated with a "dull heave of the will," but was the kind of effort that accompanies intense interest. In fact, Book gives specific evidence to show that a general vague effort without spontaneous interest in the work itself, and without concentration of attention upon the processes to be mastered, was uneconomical, inasmuch as it did not bring about improvement.

The importance of properly inspired and directed effort in bringing about improvement through practice was also emphasized by Bryan and Harter in their study of telegraphy. They called attention to the fact that men whose ability to receive telegraphic messages had been at a dead level for years often rose to a higher level when forced to do so in order to secure or hold a higher position requiring greater speed. These men *had the capacity* for the higher achievement, and the *stimulus* of position *aroused* in them an *interest* which *led to* the *effort* and concentration of *attention* that brought about the improvement.

Examples of opportunities for zeal and concentration in class drills. — The conclusions of Book relative to the importance of attention and interest in connection with practice were derived from a study of a very complex system of motor and mental associations. It is fair to assume, however, that the same general principles would apply in the purposive memorizing or automatizing of more purely mental associations, such as learning vocabularies or poems or lists of formulæ. These principles of attention are applied in the elementary grades by providing that the drills on words in reading, and the spelling and arithmetic drills, should proceed with snap, zest, and interest. It is equally important that the same spirit should prevail in high-school class work in drills on vocabularies, in rapid oral work in algebra, and possibly in drills on fundamental facts to be learned in history and other content subjects.

As evidence of the superior effectiveness of practice which is associated with interest and zeal for improvement in one of the formal school processes, namely, the addition of numbers, Thorndike compared the amounts of improvement made by two groups of subjects. The first group had been adding under varying conditions, to determine the influence of hunger or rest or drugs or the length of the practice periods; the second group had been carrying on practice experiments in adding, to see how much they could improve their ability in adding. The second group, who were especially interested in improving, actually did make improvements that were two or three times as great as the gross gains made by the first group. In summarizing his discussion of the data, Thorndike says:

> On the whole, though the interpretation of all of these facts is somewhat uncertain, I cannot but believe that they testify to the very great potency of interest, whereby the added zeal and satisfaction at success which come from adding for improvement primarily, rather than simply to provide an investigator with material on hunger or pause-length, increase the rate of gain notably. (**9** : 225)

3. Correct recall in memorizing involves concentration of attention and saves time on parts learned. — In memorizing, one device to secure concentration of attention during the process is the use of the method of correct recall. This means that the student, instead of keeping his eyes fixed on the page during each repetition, should begin to look off as soon as it is possible to recall correctly what he has read or what is to come. At first this may be possible with mere snatches of the context, but gradually the parts that can be correctly recalled will become longer and longer, so that eventually only occasional glances at the page will be necessary to get one's bearings or to get some of the more difficult parts. At all stages, however, the student should be careful to avoid incorrect recall as far as possible, for such recall tends to establish incorrect associations which will interfere with the correct ones that the student is trying to make automatic.

The active character of the process of recall tends to hold the attention much better than it is held by mere repetition in the form of rereading. The latter process tends to become a mere passive, mechanical operation, with the result that attention wanders to other matters.

Another advantage of the method of recall is that it informs the student concerning the progress that has been made in the learning; that is, it lets him know what parts are learned for the time being and what parts are not. If the parts that are not learned present certain special difficulties, they may then be attentively examined to discover the nature of the difficulties or to clear up some of the connections in the context.

For a discussion of the experimental evidence on the value of the method of recall, see Ladd and Woodworth (**6**) and Abbott (**11**).

4. Is memorizing by wholes better than by parts? — Considerable experimental work has been done by psychologists to determine which is better, to break up material that is to be memorized into small parts, each of which is to be memorized separately, or to repeat the whole selection clear through every time. In most cases, evidence indicates that the latter, or "whole," method is more economical than the former, or "part," method. Sometimes the part method seems better. Nearly all the experimentation has been upon verbatim, or rote, memorizing. Hence it is to be assumed that the correct connections, or associations, have been started before the drill or memorizing or automatizing begins. Thus, in memorizing a poem or a speech care should be taken to make sure that the ideas are clear before the process of verbatim memorizing begins. Moreover, if special difficulties occur with certain sections, as suggested above in the discussion of recall, there is ample justification for stopping to give these especial attention ; but in general the repetitions should be of whole thought units up to a certain limit, which has not been definitely determined. A summary of the investigations by German experimenters is given by Meumann. (**7**: 233–255)

Early American investigation of memorizing poetry. — One of the best-known American investigations of the relative efficiency of the whole and part methods is one by W. H. Pyle and J. C. Snyder which is reported in the *Journal of Educational Psychology* (1911). The summary of the article reads as follows:

> The question as to whether it is more economical, in committing to memory, to learn connected sense material by parts or to learn it as a whole is here extended to longer selections than have been considered by previous investigators. Experiments occupying some six months, though mainly restricted to a single observer, show that whether five lines or two hundred forty lines [approximately six pages] of poetry are memorized, learning by wholes is, without any exception, more economical than learning by parts, and that the relative saving is much greater in the case of long selections that require more than a single sitting [to memorize them]. Corroborative results were obtained from tests on school children. (**20**: 133–142)

The material used in this experiment consisted of selections from Longfellow's translation of Dante's "Divine Comedy." The method used in memorizing was to read the poetry over aloud at an even, natural rate. In learning units of from twenty to fifty lines in length there was a saving of 11 per cent by the whole method, if measured either by the number of repetitions or by the time required. In learning longer units there was a saving of 20 per cent.

Is whole method superior with children? — The possibility of taking advantage of the whole method with children is asserted by Meumann in the following words, which need, however, further interpretation.

> When significant material is learned, the whole procedure proves to be almost as advantageous for children as for adults, as is shown by the following data: Employing the part procedure, an eight-year-old boy learned a verse of Goethe's "Erlkönig" in seventeen repetitions; in eleven repetitions when he employed the whole procedure. He learned another verse of the same poem in fifteen repetitions when it was divided into two sections, and immediately afterwards he learned the next verse as one section in ten repetitions. Approximately this same state of affairs was found with all school children. Subsequent relearning was easier when the stanzas had originally been learned by the whole procedure. This is true also for larger amounts of material so long as they do not fatigue the child. (**7**: 284–285)

Experiments on motor learning. — A very instructive investigation of the part and whole methods in learning to trace through a complicated four-part maze is reported by L. A. Pechstein in the *Elementary School Journal* for June, 1917, Vol. XVII, pp. 734–740. He found that the most economical learning occurred when the total complex maze was divided into four connecting areas, each of which was learned as a unit, with special devices for learning the connections between the four units.

No time wasted on useless associations by whole method. — The explanations offered for the experimentally ascertained fact that memorizing by wholes is often more economical than by parts are these. In the first place, in the case of connected material learned by the whole method, all of the associations are formed as they will be used, whereas by the part method many associations are formed that will not be used and that will interfere with certain ones that will be used.

This abstract statement can be made clear by the following illustration. Suppose a child is memorizing two stanzas of a poem, for example,

STANZA A

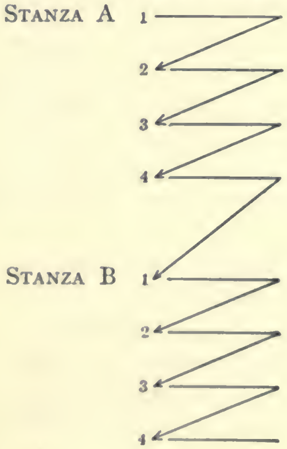
1. Mary had a little lamb,
2. His fleece was white as snow,
3. And everywhere that Mary went
4. The lamb was sure to go.

STANZA B

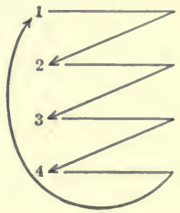
1. He followed her to school one day,
2. Which was against the rule;
3. It made the children laugh and play
4. To see a lamb at school.

The connections made by the whole and part methods may be represented by the following diagrams:

Whole method



Part method (that is, stanza by stanza)



In the *whole* method the arrows indicate that the end of each line becomes associated with the beginning of the next, which is as it should be. In the *part* method, by which stanza A is repeated by itself until memorized, the last arrow indicates that the end of line 4 of stanza A becomes associated with the beginning of line 1 of the same stanza. This is an association that we do not care to build up. Hence time is wasted in building up an association which we do not want, and which, later on, will interfere with the association that we do want, namely, of the end of line 4 of stanza A with the beginning of line 1 of stanza B.

Greater concentration of attention by the whole method. — Another explanation of the frequent superiority of the whole method of memorizing over the part method is that the whole method may secure greater concentration of attention. If small parts are repeated until memorized, after one or two repetitions the repeating may continue mechanically, with relatively little attention to what is being repeated. Such repetitions without concentration of attention are relatively wasteful, as we noted above. On the other hand, if the whole is repeated every time, when the learner approaches each part it retains certain aspects of novelty or unfamiliarity which are helpful to spontaneous attention. However, if the learner tends to be discouraged by long units, the favorable influence of interest is lost, and shorter thought units should be arranged with which he can feel his progress in learning and be encouraged thereby. For younger children and slow-learning adults the units need to be shorter than for more mature and skilled learners.

5. Drill on real process; do not waste time on accessories. *Thumbing dictionaries.* — An important point in economy in learning is to waste as little time as possible on activities which are not an essential part of the activity that is being practiced. The most striking neglect of this principle is found in studying a foreign language largely by means of the dictionary. In learning a foreign language the connections, or associations, that we desire to automatize are associations of foreign symbols with their meanings, and vice versa. From the standpoint of economy in learning, the more quickly the association can be started the better; but when the student meets new words in his reading and has to look up their meaning in a dictionary, a large part of the time is spent *before the association which we desire to build up is even started.* Moreover, having found the English equivalent, he notes it for a moment and starts to search for the next word to be looked up. Hence, a large part of his time is spent on an accessory process, namely, thumbing the dictionary, while the real process of concentrated repetition of the association is slighted.

Experiments on memorizing vocabularies demonstrate waste. — The significance of this waste of time becomes apparent when we consider the large vocabulary that can be learned in a very short time if the material for the associations is provided outright and does not have to be gathered by the student. Thus, Dearborn experimented upon memorizing vocabularies provided for students in the form of parallel columns of French words and English equivalents. In presenting the tabulated results, he says:

> Subject 1, for example, learned fifty French words daily for twenty-one days. . . . As a result of the practice over one thousand new words were learned, at least for the time being, in less than six and one-half hours. The ordinary vocabulary, with the exception of paradigms and declensions, usually learned in a semester's work in university classes is, I am told, less than half of this. (**14**: 386. Cf. **9**: 142–143)

English equivalents and notes should be easily accessible. — If the translation method of teaching a foreign language is to be used, it is evident from such investigations that devices should be adopted to eliminate the waste of time in using a dictionary. If a systematic course covering at least two years is worked out, it would be quite practicable to devise a series of textbooks that would give the English equivalent of each foreign word in some convenient, accessible form the first four or five times the word occurred. In some books this has been done by interlinear translation. If there is objection to this, the new vocabulary for each page can be printed at the bottom of the page. Certainly the explanatory notes should be printed there. Think of the hours of time wasted by millions of students in finding the notes printed in the back of readers and editions of the classics! It is far better that a few editors and printers should spend some time arranging material for economical use than that the time of students should be wasted.

Flash cards save much time in drilling. — Another example of the possibility of avoiding waste of time on accessories is the use of "flash cards" for various forms of drill. In the elementary school this practice is very common in the work in arithmetic and reading. Thousands of arithmetical combinations are arranged on cards and "flashed" by the teacher before the class one at a time and very rapidly. When a pupil is called upon, he is expected to give the answer immediately. The same method could be used for rapid oral drill on many of the processes in algebra. It is being used for vocabulary drills in Latin in several places. By use of such a device practically all of the class are doing alert, rapid mathematical or linguistic thinking during the whole period of drill. No time is wasted in getting the associations or problems before their attention, and every member must be alert in expectation of being called on. Additional stimulus to attention is commonly provided by introducing the game spirit and recording the time taken to run through a given set of cards. Groups of pupils at certain ages become intensely interested in improving their own records or beating the records of other groups and succeed in accomplishing astonishing results in a short time.

6. What is the best distribution and length of practice periods? *Writing German script.* — In order to get some evidence concerning the best distribution of time for economical practice or drill, Leuba and Hyde carried on an experiment with some twenty-six subjects who were learning to write German script. (**17**: 351–369.) The practice periods were twenty minutes long. Six subjects practiced *two periods a day*, namely, at 8.40 A.M. and 1.30 P.M. Seven practiced *one period a day*, at 1.40 P.M. Six practiced *one* period *every other day*. Seven practiced *one* period *every third day*.

The following table shows the relative achievements after an equal number of periods of practice:

AVERAGE NUMBER OF LETTERS WRITTEN IN TWENTY MINUTES

	TWICE-A-DAY SUBJECTS	ONCE-A-DAY SUBJECTS	EVERY-OTHER-DAY SUBJECTS	EVERY-THIRD-DAY SUBJECTS
After 5 practices	625	825	780	750
After 10 practices	865	1115	1175	985
After 15 practices	1015	1540		

It is quite evident from this table that the once-a-day subjects achieved much more after a given number of periods of practice than did the twice-a-day subjects.

Learning to use new alphabets. — Another experiment to determine the most economical amount of time to spend each day in practice was described by Pyle in the *Journal of Educational Psychology* (1913). The practice material consisted of arbitrary new alphabets of twenty-six characters each. Practice with a given alphabet consisted in translating ordinary printed material into it. This is known by psychologists as a *substitution test*. In summing up the results from several subjects who carried on such practice with varying amounts of time per day, Pyle says:

> On the whole our experiments warrant some such conclusion as the following: In habit formation [in the case of simple substitution

experiments] an adult can practice profitably for something like thirty minutes daily. The length of time for practice doubtless varies with individuals and with the stage of fixation of the habit. If practice is extended beyond thirty minutes, there may be some return for the extra time, but it is relatively small. It is quite probable that in the later stages of habituation the length of practice period could be shortened and the interval lengthened with practically as much return. A second practice on the same day is not quite as beneficial as the first practice. After a few practices, further practice on the same day is useless. (**19** : 158. Cf., however, **19** ***a***)

Distributed repetitions best in memorizing. — In the investigation of memorizing it has also been found that distributed repetitions are more economical than continuous repetitions. Thus, Ebbinghaus found that when the repetitions of series of nonsense syllables were distributed over three days, each series required thirty-eight repetitions, while sixty-eight repetitions were necessary for a series when they were all performed at a single sitting. (**7** : 265.) Another German investigator named Jost

devoted thirty repetitions without pause to the learning of a series of syllables; in another case he employed ten repetitions on each of three successive days. In both cases he tested accuracy of retention twenty-four hours after the repetitions had been completed. He found that the syllables which had been learned with distributed repetitions were retained better than those which had been learned with the same number of accumulated repetitions. Jost also attempted to determine how far the distribution of repetitions may be carried without giving rise to a deleterious result. He found that when the material to be learned is of large mass, the most extensive distribution is the most advantageous, both as to rapidity of learning and permanence of retention. (**7** : 266)

Lecture notes and readings should be reviewed soon after first repetition; later at increasing intervals. — Lyon, who has specialized upon the study of economy in memorizing, gives the following practical conclusion:

> With reference to the problem of the most favorable distribution of single readings . . . I would say that the most general statement that can be made, taking all materials and methods of presentation into consideration, is that the most economical method is to distribute the readings over a rather lengthy period, the intervals between the readings being in arithmetical proportion. For example, with one individual, in memorizing a poem of twenty stanzas, the highest retentiveness was obtained by distributing the readings as follows: two hours, eight hours, one day, two days, four days, eight days, sixteen days, thirty-two days, etc. The practical bearing of the results obtained on education in general is that when associations have once been formed, they should be recalled before an interval so long has elapsed that the original associations have lost their color and cannot be recalled in the same shape, time, and order. In general it was found that the most economical method for keeping material once memorized from disappearing was to review the material whenever it started to fade. Here also the intervals were found to be, roughly speaking, in arithmetical proportion. For similar reasons the student is advised to review his lecture notes shortly after taking them, and, if possible, to review them again the evening of the same day. Then the lapse of a week or two does not make nearly so much difference. When once he has forgotten so much that the various associations originally made have vanished, a considerable portion of the material is irretrievably lost. (**18**: 161)

The results of the experiments by Leuba, Pyle, Ebbinghaus, Jost, and Lyon upon distributed practice versus more continuous practice should not be accepted as final and as furnishing entirely reliable guides for school programs without further critical study of the results of other experimenters. Such a critical comparison is furnished by Thorndike in his "Psychology of Learning" (**9** : 193–206), but the results are often so contradictory that the following tentative statement is the only general conclusion that he provides:

> The experimental results obtained justify in a rough way the avoidance of very long practice periods and of very short intervals.

They seem to show, on the other hand, that much longer practice periods than are customary in the common schools are probably entirely allowable, and that much shorter intervals are allowable than those customary between the first learning and successive reviews in schools. (**9** : 194)

On the whole, however, so very few of the infinite number of ways in which any given total time can be distributed have been tested for even substitution tests and addition, that psychology has little yet to offer in advance of the experience of sagacious workers. (**9** : 206)

Empirical discussion of practice upon the piano. — There is a large body of empirical or practical discussion of the principles of effective and economical practice. To a certain extent the conclusions reached by practical teachers are in harmony with the results of experimental investigations. As an exercise in further thinking about the results presented up to this point in the chapter, students may examine and evaluate the suggestions for practice contained in the following quotation from Josef Hofmann's book entitled "Piano Playing," from which other excerpts have been quoted above on pages 111–112. Under the head of General Rules, Hofmann writes as follows:

> *Now, as to Practice.* Let me suggest that you never practice more than an hour, or at the most two hours, at a stretch, according to your condition and strength. Then go out and take a walk and think no more of music. This method of mental unhitching, so to speak, is absolutely necessary in order that the newly acquired results of your work may, unconsciously to yourself, mature in your mind and get, as it were, into your flesh and blood. (Compare Thorndike **9** : 300–331)
>
> After every half hour make a pause until you feel rested. Five minutes will often be sufficient.
>
> *A valuable little hint here*, if you will allow me: Watch well that you actually hear every tone you mean to produce. Every missing tone will mean a blotch upon your photographic plate in the brain. Each note must be not mentally but physically heard, and to this

imperative requirement your speed must ever subordinate itself. It is not at all necessary to practice loudly in order to foster the permanence of impressions. Rather let an inward tension take the place of external force. It will engage, sympathetically, your hearing just as well.

With regard to finger exercises. Do not let them be too frequent or too long — at the most a half hour a day. A half hour daily, kept up for a year, is enough for anyone to learn to play one's exercises.

A rule for memory exercises. If you wish to strengthen the receptivity and retentiveness of your memory, you will find the following plan practical: Start with a short piece. Analyze the form and manner of its texture. Play the piece a number of times very exactly, with the music before you. Then stop playing for several hours and try to trace the course of ideas mentally in the piece. Try to hear the piece inwardly. If you have retained some parts, refill the missing places by repeated reading of the piece, away from the piano. When next you go to the piano (after several hours, remember), try to play the piece. Should you still get "stuck" at a certain place, take the sheet music, but play only that place (several times, if necessary), and then begin the piece over again, as a test if you have better luck this time with those elusive places. If you still fail, resume your silent reading of the piece away from the piano. Under no circumstances skip the unsafe place for the time being and proceed with the rest of the piece. By such forcing of the memory you lose the logical development of your piece, tangle up your memory, and injure its receptivity.

With regard to technical work: Play good compositions and construe out of them your own technical exercises. In nearly every piece you play you will find a place or two of which your conscience tells you that they are not up to your own wishes — that they can be improved upon either from the rhythmical, dynamical, or precisional point of view. Give these places the preference for a while, but do not fail to play from time to time again the whole piece, in order to put the erstwhile defective and now repaired part into proper relation to its context. Remember that a difficult part may "go" pretty well when severed from its context and yet fail utterly when attempted in its proper place.

As to the number of pieces: The larger the number of good compositions you are able to play in a finished manner, the better grow your opportunities to develop your versatility of style; for in almost every good composition you will find some traits, peculiar to itself only, which demand an equally special treatment. To keep as many pieces as possible in your memory and in good technical condition, play them a few times each week. Do not play [each], however, in consecutive repetitions. Take one after the other. After the last piece is played, the first one will appear fresh again to your mind. This process I have tested and found very helpful in maintaining a large repertory. (**4**: 19–27)

Conclusion of discussion of automatizing associations. — This will conclude the third of the chapters which deal primarily with processes of association in teaching. Of these, Chapter VI treated the problem of forming correct motor responses to situations; Chapter VII contained a discussion of the best methods of associating symbols and meanings. The present chapter has emphasized the most economical and effective methods of automatizing or making permanent various types of associations. A summary of the important factors in such economical automatizing is found at the beginning of this chapter. In the next chapter we shall take up the third type of learning which we are to consider, namely, reflective thinking.

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EXERCISES

For problems for class discussion of Chapter VIII with numerous practical examples of drill processes in high schools, see *Exercises for "Methods of Teaching in High Schools,"* pp. E 74–E 81.

CHAPTER IX

REFLECTIVE THINKING

PROBLEM-SOLVING. ACQUIRING ABSTRACT AND GENERAL MEANINGS

Main points of the chapter. — 1. The third type of learning that is to be considered is reflective thinking.

2. In the form of problem-solving, reflective thinking plays a large part in many school subjects and in social life.

3. The social sciences furnish some of the best opportunities for problem-solving.

4. A study of the nature of problem-solving shows that it involves the evaluation of many suggestions, of which many may not be useful. Hence the process often necessarily consumes considerable time.

5. The teacher should assist students (*a*) to define the problem carefully and to keep it clearly in mind; (*b*) to be fertile in suggestion by analyzing the problem and formulating definite hypotheses or recalling general principles that may apply; (*c*) to evaluate critically each suggestion presented and to verify those which are tentatively accepted; and (*d*) to keep the thinking carefully organized by taking stock of progress made and by using methods of tabulation and graphic representation.

6. The following types of opportunities for reasoning are presented to students: (*a*) to reason independently; (*b*) to participate in group reasoning; (*c*) to follow and supplement the teacher's reasoning; (*d*) to follow a course of reasoning expressed in a book. All of these are profitable for bright students but not equally so for poor ones.

7. Acquiring abstract and general meanings is prominent in many subjects, especially those possessing a technical terminology, and is an important aspect of reflective thinking.

8. The best starting point for teaching a new abstraction is a familiar, personal experience. Many new abstract meanings may be derived from experiences already possessed by students.

9. For poor or mediocre students active analytical thought is the best basis for learning new abstractions. Superior students may learn them easily from expository teaching.

10. For many technical terms an exact definition is necessary. This should be reached by the students by a continuous process of summarizing or generalizing as the thinking proceeds.

11. General ideas aid in solving personal and social problems (*a*) by enabling one to apply to a particular case the method of treatment appropriate to the whole class, and (*b*) by opening up possibilities of inferring many practical corollaries which may necessarily follow from the general fact.

Problem-solving and acquiring abstract and general meanings. — In preceding chapters we considered two types of learning, namely, acquiring motor skill and associating symbols and meanings. The third type, which we shall take up in this chapter, is reflective thinking. Two aspects will be considered. The first is problem-solving. It involves not simply the recalling of ideas in old-established connections, but the searching for and testing of means of dealing with new and perplexing situations. The second aspect, which we shall consider in the second section of the chapter, is the acquiring of clearly defined abstract and general meanings, such as acceleration, wealth, justice, etc.

SECTION I. PROBLEM-SOLVING

May be required in other subjects than mathematics and natural science. — This type of learning may be present in most school subjects but is especially prominent in a few as subjects are ordinarily taught. Evidently mathematics and natural science provide for problem-solving. The grammatical work in a foreign language does this also, since it is practically the study of the science of language. Because these subjects have provided for reflective thinking in the past more than other subjects have, it has been claimed that they offer superior opportunities for training in this kind of learning; but it is easy to see that opportunities for solving problems need not be confined to these subjects. For example, historical and social studies may be taught so as to require much reflective thinking by students. In fact, studies of human nature and society (psychology, ethics, sociology, civics, economics, education) lend themselves very easily to this type of treatment. This is due to the fact that most students already have the raw material, the elements of these studies, within their own lives, and have had considerable experience in solving problems of human nature.

Socrates demonstrated possibilities in social sciences. — The possibilities of reflective thinking in connection with studies of human nature and society are illustrated by the teaching done by Socrates (469–399 B.C.), the founder of the so-called but little understood Socratic method. Socrates in his discussions dealt largely with problems of the social sciences. Upon meeting the youth of Athens, he quizzed them about their experiences, raised questions which perplexed them, and then guided them through a maze of further perplexities to some goal which he had in mind. To be sure, most of the reflective thinking was done by Socrates, and the audience simply served to furnish points of departure or foils for his discussions, but the latter furnish clear evidence of the possibilities of instruction involving reflective thinking in connection with social studies.

Problem-solving methods used in an economics textbook. — The possibilities of using a problem-solving method in school in the teaching of the social subjects are illustrated by the "Outlines of Economics developed in a Series of Problems," prepared by members of the department of Political Economy of The University of Chicago (L. C. Marshall, C. W. Wright, and J. A. Field). In this book of some hundred fifty pages there is practically none of the ordinary descriptive or expository material found in most textbooks. Instead, the book consists almost wholly of carefully organized series of questions preceded by brief outlines of the main topics under consideration. The following quotation, which is given at some length in order to illustrate the method fully, is taken from pages 28–29 of the book.

I. SPECIALIZATION

- *a*) Specialization in Relation to Exchange.
- *b*) The Separation of Occupations.
- *c*) The Division of Labor.
- *d*) Territorial, or Geographical, Specialization.
    - i. Grouping of Related Industries.
    - ii. Grouping of Many Plants of the Same Industry.
- *e*) Factors Limiting the Degree of Specialization.
    - i. The Nature of the Industry.
    - ii. The Extent of the Market. (Note the relation of transportation to the extent of the market.)
    - iii. Social Institutions.
    - iv. Financial Organization.

QUESTIONS

1. Is any specialization of economic activity possible so long as every individual must supply all his needs independently? For example, could the distinction between farmer and hunter, or between hunter and fisherman, arise under such conditions?

2. Does the domestic specialization according to which the woman cooks and weaves while the man hunts or cultivates the soil depend on exchange?

3. Can you think of anyone to-day who engages in every kind of work necessary to produce the commodities which he uses?

4. Why can more be produced by a given number of persons if each devotes himself to a special operation?

5. Do the advantages of specialization apply to the use of capital and land as well as to the employment of labor?

6. Give examples from your own observation of (*a*) the division of labor; (*b*) territorial grouping of related industries; (*c*) territorial grouping of plants of the same industry.

7. What were the motives that led to the specialization you have mentioned in answering (*b*) and (*c*) under question 6?

8. Give concrete examples of cases where specialization is limited by the nature of the industry itself.

9. Can specialization be carried as far in bicycle repair shops as in bicycle manufacturing? Why or why not?

10. Give examples of specialized occupations which are made possible by the degree of exchange coöperation which exists within (*a*) small villages; (*b*) towns of 5000 inhabitants; (*c*) large cities.

11. Show specifically how specialization has depended on the widening of the market.

12. Is it in general more true that widening markets have led to specialization or that the increased productivity of specialized industry has enlarged markets?

13. Nowadays one machine completes the process of pin-making, which in Adam Smith's day occupied ten men. Has there been an increase or a decrease in specialization?

14. What new forms of specialization and what enlargements of the market accompanied the transition from the handicraft system to the factory system?

15. Show how specialization of industry in respect to (*a*) products and (*b*) location is related to the development of transportation.

16. Cite instances where social institutions affect the degree of specialization.

17. How has the increasing economic freedom of women reacted upon specialization? What further changes may be expected?

18. Show the relation of financial organization to the extent of specialization. (**17**: 28–29)

These questions are supplemented by assigned readings.

Problem-solving in history. — Opportunities for problem-solving are also found in the teaching of history. Thus, after stating that a few large, important topics should be chosen for intensive study in this subject, De Garmo says:

> Each of these gives rise to one or more problems proper, and usually to a number of subsidiary aims. For instance, in the case of the frontier the main problem before the class would be to determine the influence of the frontier in American history. About this problem will cluster the gathering of historical facts, the influences that have a causal power, and the various channels through which these causes produce their diverse effects. In other words, the main problem will break up into a number of subsidiary ones, as, for example, What influence had the trapper's frontier upon that of the rancher? What modifying influences had the settlements immediately beyond the "fall line" upon those below it? How did the frontier regions control legislation for internal improvements? for the distribution of the public domain? for protection to new industries, etc.? (**4**: 82)

Organized exercises for reasoning in history.—A scheme for organizing the teaching of history so as to provide just as definite exercises in reflective thinking as are provided in mathematics or science is described by M. W. Keatinge, an English writer, in a book entitled "Studies in the Teaching of History." The exercises are to be based upon the examination and study, by the pupils, of selected passages from documents in English history. In discussing his plan for the exercises, Keatinge says:

> Our subject, then, must be reduced to problem form, and our pupils must be confronted with documents and forced to exercise their minds upon them. A word of explanation is here needed. It is possible and suitable to derive a portion of our method from the scientific processes of the historian, but it must not be imagined that the aim is to convert schoolboys into historians. The boy is no more placed in the position of the historian, who weighs and estimates his raw material, than the boy in the laboratory who is being put through a course of practical work is . . . being placed in the position of the scientific discoverer. Neither does the pupil,

as the American votaries of the source method would have it, construct his own history and write his own textbook. What really takes place is widely different. The boy is given problems and exercises devised so that they suit his strength and cultivate certain activities and powers, and these exercises are of a highly artificial kind. They are as artificial in their relation to historical method as the exercises and proofs in the school algebra are to the mathematics of the engineer, the actuary, and the advanced mathematician. Scientific historical method shows the schoolmaster the way; his instinct and his experience direct him to the details of practice. (**15**: 38)

The exercises provided may be readily graded from the standpoint of difficulty. For example, an easy one occurs in case the class is studying the reign of Richard II and the Peasants' Revolt but has not been introduced to any of the sources. They are given an extract from Froissart, without any information as to its authorship. The exercise and its possible answers are discussed by Keatinge as follows. The italicized statements are quotations of evidence from the source in question.

Exercise. From the internal evidence write down everything that can be gathered about the author.

The points that a boy may reasonably be expected to get hold of are the following:

1. The writer was contemporary. *From the information I had at the time on the subject.*

2. He seems acquainted both with England and with Europe. *It is customary in England as well as in several other countries.*

3. He appears to know the situation in England very well. *For example, reference to Kent, Essex, Sussex, and Bedford.*

4. He seems to be on the side of the upper classes. *The evil disposed [persons] in these districts.*

5. But is at the same time sympathetic with the rebels.

6. He may have been a priest with conservative tendencies. *A crazy priest, who for his absurd preaching.*

General inference — He was either an Englishman who had traveled abroad or a foreigner who had come to live in England. He may have been a man of humble birth, who therefore knew the views of the poorer classes, attached as a secretary to some noble house. He may also have been a priest. (**15**: 41–42)

For an example of a source book in history which uses the problem-solving method see number 14 in the bibliography at the end of this chapter.

It is not necessary to quote examples from other subjects to show that problem-solving not only plays a large part in mathematics and science but may do so in all subjects that have any large intellectual content. These problems may vary, in length of time consumed, from a brief one in algebra, involving a half-minute for a solution, to such as are taken up in debates, in connection with which students sometimes work for months, studying the problem, formulating it, searching for evidence, organizing their ideas, refuting arguments, etc.

Problem-solving is an important activity in social life. — The importance of learning that involves reflective thinking is easily demonstrated. It is self-evident that the ability to deal with new and perplexing situations is an important element in practical efficiency. The conditions of life, both for society as a whole and for individuals, are continually changing, and the discovery of new methods of thinking and behaving must keep pace. The *relative* importance of this type of learning varies, however, among individuals, when compared with learning which involves motor skill or the automatizing of manifold associations which are to be recalled and used over and over again in fairly fixed forms. In many vocations motor skill and thousands of habitual associations play a larger part than do the opportunities to solve problems or deal with perplexities by reflective thinking. To be sure, skill in reflective thinking is a useful asset in any position, but there is danger of losing sight of the fact that other types of activity and other modes of learning are also important elements in efficiency.

Variations from great inventions to everyday domestic problems. — The practical inventor and the innovator in the work of applied science furnish striking examples of the social importance of reflective thought. With them rank the great originators of social reforms, the men and women who furnish the ideas that more mediocre thinkers copy and put into execution. From these great problem-solvers we may pass by gradual steps to common everyday men or women with their domestic and economic problems or perplexities, such as whether to feed the baby cow's milk or some prepared food ; whether to whip the youngster or to overlook his misdeeds ; whether to eat all the meat one desires or to be a vegetarian ; whether to let a cold run its course or to consult a physician ; whether to pay rent or buy a home in the building association, etc. Many persons whose vocational activities are highly routinized are confronted only by such problems as these. In the lives of all people, however, they play a very important part, and schools are beginning to realize this and to provide training that looks toward efficiency in dealing with the problems of common everyday life.

Classification of everyday problems. — A systematic classification of these everyday problems reveals the following types if we adopt the basis for classification used in Herbert Spencer's "Education," in the chapter entitled What Knowledge is Most Worth ?

1. *Problems of health.* — For example : What shall I eat in order to secure the best physiological results ? How shall I secure adequate ventilation under difficult and varying conditions ? How shall I avoid certain common diseases, such as tuberculosis and sexual diseases, with their attendant dangers ? What steps, such as cold baths, antiseptic gargles, etc., shall I take to avoid common contagions, such as colds ? What can I do in the way of first aids, first precautions, etc. in the case of sickness ? What is a reasonable scientific treatment of simple ailments as distinguished from superstitious

traditional treatment? How much exercise do I need and what opportunities can I take advantage of to secure it?

2. *Problems of making a living.* — For example: What are my capacities; that is, for what am I fitted by nature? What are the opportunities in various vocations? What are my opportunities to secure training and how can I best take advantage of them? How shall I secure a position? What attitude shall I assume toward my work? How keep on improving myself? How keep in touch with advances in my vocation? How devise improved methods of manufacturing, transporting, selling, recording, etc.?

3. *Domestic problems.* — For example: Shall I get married? If a man, can I support a family? If a woman, can I keep house efficiently (including one thousand detailed problems for reflective thought)? Is my prospective "better half" congenial; healthy, especially free from tuberculosis and sexual diseases; likely to be efficient and successful? How can I best distribute the income for food, rent, clothes, recreation, etc.? What shall I feed the children? How discipline them? How direct their play, reading, home education? How cooperate with the school? How save and invest money? How much and what kind of insurance shall I carry?

4. *Civic problems.* — For example: Shall I register today? Shall I vote? For what candidates? Shall I keep my yard clean and beautiful? How shall I aid charitable enterprises?

5. *Recreational problems.* — For example: Have I time to read for pleasure? Shall I read what I like or read for "high brow" motives? How much shall I go to the theater? Shall I go to be amused or to be improved? Shall I keep up my music? Shall I play golf? What clubs shall I belong to? Shall I play bridge or poker? Shall I gamble? How shall I spend my vacation?

These are typical problems of everyday life. It is in connection with such problems that most high-school students will do most of their reflective thinking after graduation. A few will continue their education and undertake scientific work in universities and continue it in after life, but only a very few. Most of the activities related to health, vocation, family, society at large, and recreation will be reduced to the plane of habit, and the school should endeavor to establish as many useful habits along these lines as possible. But there will still remain many perplexities, of which those cited in the above classification are typical.

May depend on impulsive decision or reflective inquiry. — It is important to remember that these everyday problems may be disposed of by the most impulsive decision or may lead to the most careful kind of a reflective inquiry. The problem of caring for and feeding a baby illustrate these two possibilities. A mother may rely entirely on tradition, routine, and impulse or may devote several hours a week to a careful study of the diet which is best adapted to the child's special needs. The determination of the diet of adult persons and even of domestic animals offers similar opportunities for reflective thought and investigation.

Planning a vacation illustrates solving personal problem. — A good example of a problem to which persons of moderate means devote considerable reflective thought is how and where to spend one's vacation. The problem is one of intense personal interest and commonly calls forth thoughtful consideration and prolonged investigation for its solution. The type of thinking and the methods of investigation used might well serve as models of one type of mental activity which it would be desirable to secure in the school. If students would study carefully the methods by which they solve this problem or some other which makes a similar personal appeal, they would arrive at a fair understanding of the psychology of reflective thinking or reasoning, since reasoning may be defined as reflective or purposive thinking which solves or tries to solve problems.

Nature of mental activity in problem-solving. — Assistance in understanding how students carry on reflective thinking or reasoning ought to be secured from textbooks on psychology, but unfortunately the accounts found in these are often confusing instead of helpful. This is partially due to the fact that writers have often failed to distinguish clearly between (*a*) the character of the thinking *process* as it goes on and (*b*) the qualities of the finished *product* of reflective thought after it is written out. The finished product of the thinking of a scientist, for example, does not represent the thinking which he has done, but merely the ideas which he cared to retain and express. Many of the psychological discussions are largely descriptions of what is found in the attenuated finished product, and leave out of account the rich thought-movement which has led up to the final result.

Difference between process and final product illustrated in Kepler. — The difference between the process of reflective thought and its finished product is well illustrated by the following account of the investigations made by Kepler (1571–1630), the great astronomical genius. The account is quoted from William Whewell's "History of the Inductive Sciences."

> Advances in knowledge are not commonly made without the previous exercise of some boldness and license in guessing. The discovery of new truths requires, undoubtedly, minds careful and scrupulous in examining what is suggested, but it requires, no less, such as are quick and fertile in suggesting. What is invention except the talent of rapidly calling before us many possibilities and selecting the appropriate one? It is true that when we have rejected all the inadmissible suppositions, they are quickly forgotten by most persons, and few think it necessary to dwell on these discarded hypotheses, and on the process by which they were condemned, as Kepler has done. But all who discover truths must have reasoned upon many errors to obtain each truth; every accepted doctrine must have been one selected out of many candidates. In making many conjectures which on trial proved erroneous, Kepler was no

more fanciful or unphilosophical than other discoverers have been. Discovery is not a cautious or rigorous process in the sense of abstaining from such suppositions. But there are great differences, in different cases, in the facility with which guesses are proved to be errors and in the degree of attention with which the error and the proof are afterwards dwelt on. Kepler certainly was remarkable for the labor which he gave to such self-refutations and for the candor and copiousness with which he narrated them; his works are in this way extremely curious and amusing and are a very instructive exhibition of the mental process of discovery. But in this respect, I venture to believe, they exhibit to us the usual process (somewhat caricatured) of inventive minds — they rather exemplify the *rule* of genius than (as has generally been hitherto taught) the *exception*. We may add that if many of Kepler's guesses now appear fanciful and absurd, because time and observation have refuted them, others, which were at the time equally gratuitous, have been confirmed by succeeding discoveries in a manner which makes them appear marvelously sagacious, as, for instance, his assertion of the rotation of the sun on [its] axis before the invention of the telescope, and his opinion that the obliquity of the ecliptic was decreasing but would, after a long-continued diminution, stop and then increase again. Nothing can be more just, as well as more poetically happy, than Kepler's picture of the philosopher's pursuit of scientific truth, conveyed by means of an allusion to Vergil's shepherd and shepherdess.

Malo me Galatea petit, lasciva puella,
Et fugit ad salices, et se cupit ante videri.

Coy yet inviting, Galatea loves
To sport in sight, then plunge into the groves;
The challenge given, she darts along the green,
Will not be caught, yet would not run unseen.

We may notice as another peculiarity of Kepler's reasonings the length and laboriousness of the processes by which he discovered the errors of his first guesses. One of the most important talents requisite for a discoverer is the ingenuity and skill which devises means for rapidly testing false suppositions as they offer themselves.

> This talent Kepler did not possess; he was not even a good arithmetical calculator, often making mistakes, some of which he detected and laments, while others escaped him to the last. But his defects in this respect were compensated by his courage and perseverance in undertaking and executing such tasks; and, what was still more admirable, he never allowed the labor he had spent upon any conjecture to produce any reluctance in abandoning the hypothesis as soon as he had evidence of its inaccuracy. The only way in which he rewarded himself for his trouble was by describing to the world, in his lively manner, his schemes, exertions, and feelings. (**24**: 291–292)

Galton's description of reflective thinking. — Another example of the difference between the finished product of reflective thought and the process itself is found in the descriptions by Sir Francis Galton (1822–1911) of his own thinking and of that of others in solving problems or organizing a series of ideas. Galton said:

> When I am engaged in trying to think anything out, the process of doing so appears to me to be this: The ideas that lie at any moment within my full consciousness seem to attract of their own accord the most appropriate of a number of other ideas that are lying close at hand, but imperfectly within the range of my consciousness. There seems to be a presence chamber in my mind where full consciousness holds court, and where two or three ideas are at the same time in audience, and an antechamber full of more or less allied ideas, which is situated just beyond the full ken of consciousness. Out of this antechamber the ideas most nearly allied to those in the presence chamber appear to be summoned in a mechanically logical way, and to have their turn of audience.
>
> The successful progress of thought appears to depend, first, on a large attendance in the antechamber; secondly, on the presence there of no ideas except such as are strictly germane to the topic under consideration; thirdly, on the justness of the logical mechanism that issues the summons. The thronging of the antechamber is, I am convinced, altogether beyond my control; if the ideas do not appear, I cannot create them nor compel them to come. The

exclusion of alien ideas is accompanied by a sense of mental effort and volition whenever the topic under consideration is unattractive; otherwise it proceeds automatically, for if an intruding idea finds nothing to cling to, it is unable to hold its place in the antechamber, and slides back again. (**12**: 203–204)

James and Dewey provide best discussions of reflective thinking. — In recent years the writings of William James (1842–1910) and Professor John Dewey have tended to concentrate attention on the psychology of the thinking *process* itself as distinguished from the logical quality of the finished *products* of such thinking. Dewey's "How we Think" (1910) contains the best accounts of the results of this study. It takes up such topics as the following: What is thought? The need for training thought. The analysis of a complete act of thought. Language and the training of thought. The recitation and the training of thought, etc. The student who is interested in studying the process of reflective thought intensively should read Dewey's book carefully several times. Most of the recent books on methods of teaching exhibit results of Dewey's influence.

Dewey's summary of characteristics of reflective thinking. — The following quotation summarizes Dewey's characterization of reflective thought. In reading it the student should have in mind some examples of reflective thinking which he has carried on, such as planning a vacation, in order to see whether Dewey's description is typical. The headlines are not in the original, and the paragraphing is slightly altered.

Origin in some perplexity. — We may recapitulate by saying that the origin of thinking is some perplexity, confusion, or doubt. Thinking is not a case of spontaneous combustion; it does not occur just on "general principles." There is something specific which occasions and evokes it. General appeals to a child (or to a grown-up) to think, irrespective of the existence in his own experience of some difficulty that troubles him and disturbs his equilibrium, are as futile as advice to lift himself by his boot-straps.

Form a tentative plan based on past experience. — Given a difficulty, the next step is suggestion of some way out — the formation of some tentative plan or project, the entertaining of some theory which will account for the peculiarities in question, the consideration of some solution for the problem. The data at hand cannot supply the solution; they can only suggest it. What, then, are the sources of the suggestion? Clearly past experience and prior knowledge. If the person has had some acquaintance with similar situations, if he has dealt with material of the same sort before, suggestions more or less apt or helpful are likely to arise. But unless there has been experience in some degree analogous, which may now be represented in imagination, confusion remains mere confusion. There is nothing upon which to draw in order to clarify it. Even when a child (or a grown-up) has a problem, to urge him to think when he has no prior experiences involving some of the same conditions is wholly futile.

Plan not accepted until carefully examined and criticized. — If the suggestion that occurs is at once accepted, we have uncritical thinking, the minimum of reflection. To turn the thing over in mind, to reflect, means to hunt for additional evidence, for new data, that will develop the suggestion and will either, as we say, bear it out or else make obvious its absurdity and irrelevance. Given a genuine difficulty and a reasonable amount of analogous experience to draw upon, the difference, *par excellence*, between good and bad thinking is found at this point. The easiest way is to accept any suggestion that seems plausible and thereby bring to an end the condition of mental uneasiness. Reflective thinking is always more or less troublesome, because it involves overcoming the inertia that inclines one to accept suggestions at their face value; it involves willingness to endure a condition of mental unrest . . . . Reflective thinking, in short, means judgment suspended during inquiry, and suspense is likely to be somewhat painful. . . . The most important factor in the training of good mental habits consists in acquiring the attitude of suspended conclusion and in mastering the various methods of searching for new materials to corroborate or to refute the first suggestions that occur. To maintain the state of doubt and to carry on systematic and protracted inquiry — these are the essentials of thinking. (**5**: 12–13)

Assisting pupils to solve problems. — Such thinking as Dewey describes has various characteristics which are summarized in these quoted paragraphs. In order to bring out these characteristics more clearly, we shall take up several of them for detailed consideration. In each case we shall be interested primarily in two points; namely, (1) how is the given characteristic related to efficiency or skill in reflective thinking, and (2) how can the teacher assist pupils to acquire or exhibit this efficiency. The characteristics will be taken up under the following main headings.

I. Defining the problem and keeping it clearly in mind.
II. Stimulating fertility of suggestion.
III. Critical evaluation of suggestions.
IV. Methods of organizing the material of thinking.

I. *Defining the Problem*

Great differences between individuals in ability to define problems. — The first essentials in efficient reflective thinking are (*a*) to get the problem or difficulty clearly in mind, that is, to get it clearly defined, and (*b*) to keep it clearly in mind. There are interesting individual differences in the ability to follow these rules. We may distinguish roughly three degrees of efficiency in locating and defining problems.

For example, in what may be assumed to be a perplexing situation, at one extreme we shall find some persons who will not see any problem in it at all; they will not realize that there is anything wrong or that anything needs to be done. This complacent attitude is exhibited by people in all types of situations, in case a train is delayed or some one is ill, or if the tariff needs readjustment or a school curriculum needs revision. They simply "sit tight" mentally and are not disturbed.

Somewhat more developed than this type are those persons who have a vague feeling that something is wrong and something ought to be done, but who are not clear as to the nature of the problem. They are likely simply to look worried and wring their hands or to jump to conclusions and do various things in random or impulsive ways. Thus, if a person has a headache, an observer may feel sorry but sit by in a helpless sort of way; or he may prescribe soda mints, pepsin, hot water, aspirin, salts, liver pills, and all the other remedies that he can recall as having been used in cases of headache, and may urge the sick one to take them all. Another good example is found in the activities of the automobile owner who begins to tinker in all sorts of random ways with his machine when trouble appears, instead of making some intellectual study of the problem presented.

On the other hand, a skilled, reflective thinker, represented in the case of the headache by the physician, recognizes that the first essential is to define the problem more specifically by finding the probable cause of the headache. He keeps this problem of diagnosis in mind and works on it, asking questions which will define the trouble more and more clearly.

Deliberative bodies have difficulty in keeping a problem in mind. — The part played in reflective thinking by the two factors which we have been discussing, namely, (*a*) locating and defining a problem and (*b*) keeping it clearly in mind, are well illustrated by the thinking done in a deliberative body — for example, during a debate in a committee or before a legislative assembly. In the first place, it is very surprising how long it takes a body of well-educated persons to get the purport of a motion — to understand what is the problem before the house. In the second place, it is wonderful with what ease they will wander from the topic of the discussion — will fail to keep the problem clearly in mind. One of the chief attributes of a skilled presiding officer is his ability to keep the discussion to the problem before the house.

Another excellent example of the mental activity involved in defining problems is the preliminary work done by debating teams in determining the exact wording of a question for debate. In this case many hours may be spent in getting the problem in mind with sufficient clearness to secure a satisfactory wording.

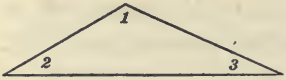
Teacher should assist pupil by authority or suggestion. — Since the failure to define problems definitely and to keep them clearly in mind is such a common tendency, it is evident that training along these lines is one of the most important phases of training in thinking. In this connection the teacher serves the same purpose as the presiding officer of a deliberative body. He may act either authoritatively, however, or by suggestion ; that is, he may either say directly that a student has not kept the problem in mind or he may by suggestion lead the student to realize this and thus begin the development of a habit of self-criticism and self-checking.

II. *Stimulating Fertility of Suggestion*

Various degrees of ability depend on knowledge and recall. — The second aspect of efficient reflective thinking concerns methods of stimulating, systematizing, and controlling suggestions. Other things being equal, the person who thinks of a hundred matters related to the perplexity or difficulty or problem is more likely to find a helpful suggestion than the person who thinks of only ten. In other words, fertility in suggestion is a helpful factor in reflective thinking. This fertility depends upon two things : first, knowledge of related ideas, and, second, the ease and fullness with which these ideas are recalled when needed. In this connection we find striking differences between individuals when confronted with a problem in connection with which they should recall and use their knowledge. Various combinations of the two factors occur, such as (*a*) little knowledge and meager recall, (*b*) vast knowledge but meager recall, (*c*) little knowledge but rather full recall, (*d*) vast knowledge and fairly full recall. It is evident that the last combination is most favorable for fertile suggestion.

How can teacher stimulate maximum of suggestions? — The point that interests us here is, assuming a given body of knowledge on the part of the thinker, How can the teacher help him to bring it to bear upon the problem? that is, how can the teacher stimulate the maximum possible fertility of suggestion under the circumstances, and how can he train the student to systematize and control it? The answer can be discussed to advantage under several subheadings.

1. *Assist students to analyze situations.* — The teacher should help the student to analyze a situation into its parts or aspects as a means of systematically stimulating suggestions. Here again we find the most striking differences between individuals who are confronted with a problem — for example, students who are trying to solve a geometry exercise. The unskilled thinker will sit and stare at the problem as if he expected the solution to jump out at him. A better type of thinker, on the other hand, will begin to break the problem up either by an analysis of its statement or by an examination of the figure which has been constructed. Instead of depending on the gross situation for suggestions, he will pick out now this aspect, now another, in hopes that the correct suggestion may occur. By multiplying the sources of suggestions he multiplies their number. By dividing he conquers. For example, let a student be given as an exercise in geometry to prove that the sum of three angles of a triangle is equal to two right angles; or, in other words, to prove, in the accompanying figure, that $\angle 1 + \angle 2 + \angle 3 = 2$ right angles.



The student who begins by dropping perpendiculars, drawing bisectors, drawing parallel lines, prolonging lines, etc.

would be more likely to succeed than a student who simply stares at the unmodified figure without drawing or imagining modifications.

Similarly, in the case of a headache, the person who begins to inquire about the place and kind of aching, what the sufferer had been doing, whether he had other pains also, whether he had fever, etc. would be more likely to find a means of dealing with the situation than one who did not open up these various avenues of suggestion.

As a third example of the value of analysis in reflective thinking, suppose the problem is to find the cause of the increased cost of living; or, to make the situation more concrete, suppose a man wants to find out why it now costs him $125 a month for running expenses, whereas two years ago it cost only $100 a month. Obviously, in this case the first step is a careful analysis and inventory of the elements which enter into running expenses. Yet hundreds of persons wonder and wonder about this problem without taking the first step to find out where the increased cost lies.

From the standpoint of the part played by analysis, James thus compares the activities of the reasoner and the ordinary unanalytical thinker:

> The results of reasoning may be hit upon by accident. [For example, although] the stereoscope was actually a result of reasoning, it is conceivable . . . that a man playing with pictures and mirrors might accidentally have hit upon it. [Similarly,] cats have been known to open doors by pulling latches, etc. But no cat, if the latch got out of order, could open the door again unless some new accident of random fumbling taught her to associate some new total movement with the total phenomenon of the closed door. A reasoning man, however, would open the door by first analyzing the hindrance. He would ascertain what particular feature of the door was wrong. The lever, for example, does not raise the latch sufficiently from its slot — case of insufficient elevation; raise door bodily on its hinges! Or door sticks at top by friction against lintel — press it bodily down! . . . By many measurements of

> triangles one might find their area always equal to their height multiplied by half their base, and one might formulate an empirical law to that effect. But a reasoner saves himself all this trouble by seeing that it is the essence . . . of a triangle to be the half of a parallelogram whose area is the height into the entire base. To see this he must invent additional lines, and the geometer must often draw such to get at the essential property he may require in a figure. The essence consists in some *relation of the figure to the new lines* — a relation not obvious at all until they are put in. The geometer's sagacity lies in the invention of the new lines. (**6** Vol. II: 339–340)

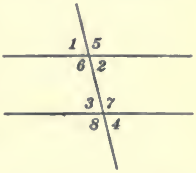
2. *Stimulate formation of definite hypotheses and recall of general principles.* — The teacher will also assist the pupil to formulate a number of hypotheses or guessed solutions of the problem. This is closely related to the systematic analysis discussed above, but brings in the element of definitely formulated possible solutions of the problem. Thus, in the case of a person suffering from a headache a series of definite hypotheses would be the following: (1) The headache may be due to acute indigestion. (2) It may be due to eyestrain. (3) It may be due to nervousness or mental strain accompanying divided or strained attention. (4) It may be a phase of some infection, such as malaria, cold, grippe, etc. Such a series of hypotheses forms a very definite basis for further suggestions, which may be treated more systematically and hence more economically and effectively.

Concerning the character of the hypothesis, De Garmo says:

> The form of the hypothesis will of course follow the solution called for by the nature of the problem. In history and in some departments of natural science it will call for either prediction as to cause or effect, or both. Were the problem, What was the effect of English home politics upon English colonial policy at the time of the [American] Revolution? the facts gathered and the hypotheses devised would pertain first to causes and then the . . . prediction as to their probable effect. In similar fashion the problem may be to determine the influence of circumstances upon two historical

characters, one of whom appears to have been molded by them, while the other seems to have controlled them for his own purposes. The hypothesis is in place here, even though it is as shifting as the flight of birds. Did this or that contingency turn the expected victory to defeat? Yes, for the sleet storm retarded the designed movement of troops. No, for there were more fundamental reasons, perhaps of a psychical nature; the men were discouraged by their losses and the apparent hopelessness of their cause. (**4** : 94)

Methods of assisting pupils to solve geometry exercises by recall of propositions. — Another way of expressing this same process from a slightly different point of view is to say that the teacher should assist pupils to recall and apply general principles or rules which may bear on the problem. This is well illustrated in the case of the student solving a geometry exercise when he is searching for the previously proven propositions which he may apply. For example, in the proposition cited above, to prove that the sum of the three angles of a triangle equals two right angles, the propositions which the pupil needs to apply are those concerning the relationships of angles formed when parallel lines are cut by transversals, as in the accompanying figure, where $\angle 1 = \angle 2 = \angle 3 = \angle 4$ and $\angle 5 = \angle 6 = \angle 7 = \angle 8$. To think, without assistance, of the application of these propositions to the problem about the triangle is probably more than could be expected of any high-school student. Some students could make the application with a little assistance from the teacher, however, while others would need much assistance and some would have to be told outright. The various stages or degrees of assistance which the teacher might offer have been discussed by Thorndike as follows:



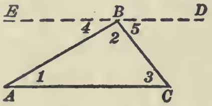
> The crucial step . . . is the direction of the pupil's search for the proper class under which to think of the fact in question. . . .

[This] essential step in reasoning must sometimes be omitted in order to preserve the less capable pupils from vain efforts or random guessing and to save time. But the wise course is not to eliminate altogether the independent search by pupils for the proper class, but to make it easier and briefer by directing it.

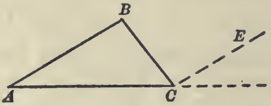
It is made easier by (1) systematizing the process of search, (2) by limiting the number of classes amongst which the pupil must search for the right one, (3) by informing him of classes which include the right one and which he would neglect if undirected, and (4) by calling his attention to the consequences of membership in this or that class. . . . [In other words, the forms of assistance may be classified as]

1. Systematizing the search.
2. Reducing alternatives.
3. Suggesting a useful alternative.
4. Suggesting consequences. (**11**: 161–163, 173)

To parallel Thorndike's application of these principles to the proving of a geometry exercise, take the example of



I. DRAW *CBD* PARALLEL TO *AC*



II. PROLONG *AC* AND DRAW *CE* PARALLEL TO *AB*

proving that the sum of the three angles of a triangle is equal to two right angles, cited above on pages 188 and 191. Probably all that would be necessary in the case of the brighter pupils would be to carry out method number 2, namely, reducing alternatives. This could be done by suggesting that either one of the above constructions might be used.

For other pupils further assistance might be necessary. Perhaps simply systematizing their search by asking them to examine the relations of the angles thus formed would help. If this did not prove to be sufficient aid, they might be informed of the classes which they should have in mind by the question, "What relationship exists between angles formed when parallel lines are cut by a transversal?" Finally, if more assistance were needed, the consequences could be suggested by asking, "In the case of figure I what relation exists between $\angle 1$ and $\angle 4$? between $\angle 3$ and $\angle 5$? What is the sum of $\angle 4 + \angle 2 + \angle 5$?"

Thus fertility of suggestion may be stimulated by the teacher's getting students to analyze, or break up, a problem or situation into various aspects, to formulate various hypotheses or guessed solutions of the problem, and to recall and apply certain general principles which they have in stock.

III. *Critical Evaluation of Suggestions*

So far we have discussed two aspects of reflective thinking, namely (I) defining the problem and keeping it in mind, and (II) fertility of suggestion. The third aspect to be considered is the critical, unbiased evaluation of suggestions from the standpoint of their bearing on the problem.

Critical ability may offset mediocre fertility of suggestion. — This aspect may be contrasted with the second aspect which we discussed, namely, fertility of suggestion. Such fertility is valuable only when it is correlated with the other two factors, namely, clear realization of the problem and critical selection and rejection with reference to it. Here again we find interesting individual differences. A person possessed of much knowledge and ready recall may be an inefficient thinker because he lacks critical ability or critical habits. Hence the child who may be considered bright when measured by the standard of glib suggestions may be stupid when measured by the standard of critical, controlled thinking. On the other hand, a person may be only mediocre in knowledge and readiness of recall but be a fairly efficient thinker because of superior critical ability.

Expressed as aspects of the teacher's method, the discussion of unbiased critical evaluation of suggestions may be formulated as follows:

1. *Maintain attitude of suspended judgment.* — The teacher should encourage pupils to maintain an attitude of suspended conclusion or suspended judgment. This is necessary not only in order to provide for a thorough canvass of the problem but also in order to obviate bias which may interfere with the thinker's selection and evaluation of data or evidence. As Dewey says in the quotation given above (page 184), "the most important factor in the training of good mental habits consists in acquiring the attitude of suspended conclusion."

Discussing the matter further, he says:

> Imagine a doctor called in to prescribe for a patient. The patient tells him some things that are wrong; his experienced eye, at a glance, takes in other signs of a certain disease. But if he permits the suggestion of this special disease to take possession prematurely of his mind, — to become an accepted conclusion, — his scientific thinking is by that much cut short. A large part of his technique as a practitioner is to prevent the acceptance of the first suggestions that arise. (**5** : 74)

The maintenance of the attitude of suspended conclusion, however, does not mean that the student will refrain from formulating definite hypotheses, but it means that he will evaluate these hypotheses in an open-minded and unbiased way. This brings us to the next phase of the teacher's method of training in reflective thinking.

2. *Criticize all suggestions.* — The teacher will stimulate students to criticize each suggestion and to think out its possible consequences. This process is discussed by Dewey in the following terms:

> Acceptance of the suggestion in its first form is prevented by looking into it more thoroughly. Conjectures that seem plausible

> at first sight are often found unfit or even absurd when their full consequences are traced out. Even when reasoning out the bearings of a supposition does not lead to rejection, it develops the idea into a form in which it is more apposite to the problem. . . . Suggestions at first seemingly remote and wild are frequently so transformed by being elaborated into what follows from them as to become apt and fruitful. (**5** : 76)

This idea is so well illustrated by the long quotation concerning the investigations by Kepler, given above on page 180, that further examples are unnecessary.

3. *Be systematic in selecting and rejecting hypotheses.* — The teacher will stimulate students to be *systematic* in selecting useful suggestions and rejecting useless ones. The emphasis here is on *orderliness* in selection and rejection. Critical evaluation will proceed much more economically if it can be so ordered as to avoid useless repetition. Hence the alternative suggestions or hypotheses which present themselves may be arranged in some order, and then considered in turn, each one being followed through in a careful and fairly thorough way. This simply means that the rule about keeping the problem clearly in mind is applied to the consideration of the various subproblems into which the main problem becomes resolved. An unskilled thinker will jump around in a more or less haphazard way from one hypothesis to another. In this way he goes over the same ground time and again and works around in a circle to a considerable extent. Again, illustrations of this failure in reflective thinking are found in the deliberations of legislative bodies, committees, etc. The chairman is constantly under the necessity of reminding some member that the topic or suggestion which he is discussing has already been thrashed out in the previous discussion and that now the meeting is considering some other aspect of the case.

This emphasis on the systematic checking and following through of one aspect at a time does not mean, however, that the thinker should refrain from returning to reconsider any hypothesis, provided some new evidence or implication occurs to mind ; but he ought to realize clearly at the time that it is *new* evidence or implication. Even in this case it may often be well to note the necessity of returning for reëxamination of the previous hypothesis but to continue at the time the consideration of the aspect to which attention was being devoted at the time the evidence for reconsideration came to mind.

4. *Verify by further evidence and by testing inferences.*— The teacher should stimulate students to verify their conclusions. One method of doing this is simply to examine other cases to see if the conclusion holds for them also. Thus, when a college president endeavors to prove the superior value of a college education by pointing to the number of college graduates who have attained high office, the unbiased investigator will ask for further evidence in the form of a random selection of college graduates, which will be found to contain men in all walks of life, including tramps and other undesirable citizens. Or if a high-school principal is claiming that he has a superior school because some of his graduates have won honors in college, verification may be secured by investigating the records of all of his graduates that go to college from several classes.

Example of Newton's verification of law of universal gravitation. — Another method of verification is to infer from the conclusion or proposition that certain other results must follow if it is true, and then to test to see if they do follow in point of fact. For example, Sir Isaac Newton (1642–1727) desired to test his hypothesis that all bodies attract each other directly as their masses and inversely as the square of the distance between them, that is, the law of universal gravitation. He chose the attraction between the earth and the moon as a basis for verification, and compared the *inferred* movements of the moon according to his law with its actual movements as *observed* by astronomers. He knew from actual astronomical observations and calculations that the moon was deflected from its tangent *thirteen* feet a minute; but by the calculation which he made in 1666, if the moon were deflected by gravity, according to his law it should be deflected *fifteen* feet a minute. So he decided that his hypothesis was not proved, because it did not agree with the observed astronomical facts. In time, however, it was discovered that the magnitude of the radius of the earth which he had used in his calculation of 1666 was incorrect. In 1679, using the correct magnitude, he repeated the calculation of the deflection of the moon according to his law, and found that the result agreed with the observed facts and consequently verified his hypothesis.

Two methods of verification illustrated by debate concerning heredity and environment. — Both methods of verification may be illustrated by the debate concerning the relative influence of environment and heredity or original nature. One person may make the statement that he believes heredity is not an important factor, because he knows of a particular case in which a son's traits could not be derived from his parents. Verification in this particular case might involve getting further evidence about it — further family history which might show, for example, that the son was like his grandfather and thus establish the fact of heredity.

The other method of verification might start from the following statement: "If heredity or original nature is a very powerful factor, we may infer that similar children who are brought up under different circumstances ought to remain similar, and different (dissimilar) children who are brought up under identical circumstances ought to remain different (dissimilar)." The verification would consist in finding such cases and noting the actual results, as Sir Francis Galton did in England in the case of similar twins brought up under different circumstances, and dissimilar twins brought up under similar circumstances. The evidence was strongly in favor of the influence of heredity; that is, the similar twins brought up differently remained similar, and the dissimilar twins brought up with similar training remained dissimilar. (**12**: 216–246)

Students should be trained to accept all conclusions as tentative and to be interested in searching for further evidence and working out the further implications of the conclusions in order to determine their validity. Among untrained thinkers nothing is more striking than their failure to require any evidence for many of their conclusions, and their inability to determine the value of evidence when it is presented; folklore, tradition, and general gossip are accepted as being reliable and as possessing the same validity as conclusions vouched for by competent experts and backed up by carefully weighed evidence.

IV. *Organizing the Material of Thinking*

Up to this point we have considered three principal aspects of reflective thinking: (I) defining the problem and keeping it clearly in mind; (II) fertility of suggestion; (III) critical, unbiased evaluation of suggestions. The fourth aspect concerns methods of organizing the material of thought in such a way as to assist in the process of thinking. In this connection the following rules may be discussed:

1. *Take stock periodically and keep systematic check on field covered.*—The teacher should stimulate pupils to "take stock" of the results of the inquiry from time to time, and to express these in a concise, clear formulation. This is particularly necessary if the inquiry takes considerable time. The "stock-taking" might involve a review of the suggestions and hypotheses that have been made, the notation of steps which are completed, the statement of what remains to be done, and the concise formulation of tentative conclusions. In reflective thinking a person ordinarily thinks of so many things, both relevant and irrelevant, that it is very easy for him to get tangled up and to lose track of what has been done and what

remains. Moreover, it is easy for a suggestion to slip his mind. He may have noted it as one to be considered, but have overlooked it in the general rush of associated ideas. If the thinking is being done by a class, a helpful device is to develop an outline on the blackboard as the discussion progresses.

2. *Use methods of tabulation and graphic expression.* — The teacher should assist students to devise and use methods of tabulation and graphic representation that will make for economy and clearness in thinking. The graphic representation of data by means of curves of distribution is a device that is now being taught even to children in elementary schools. No more striking example of the value of this aid to thinking can be found than the well-known Bryan and Harter curve, which shows the improvement made by a student who is learning the telegraphic language (see above, p. 145). The rise of the curve and its characteristic level places, or plateaus, show at a glance what the character of the learner's progress has been. Numerous examples of the use of graphic methods of representation are to be found in the textbooks on mathematics and the natural and social sciences. For examples in connection with educational inquiries see the curves on pages 373, 376, and 377, below.

Summary of suggestions for guiding reflective thinking. — In the foregoing discussion certain rules have been formulated in terms of what the teacher should do to stimulate efficient problem-solving by students. These rules may be briefly summarized as follows:

To stimulate and assist pupils in carrying on reflective thinking the teacher should

I. Get them to *define* the problem at issue and keep it clearly in mind.

II. Get them to *recall* as many related ideas as possible by encouraging them

  1. To analyze the situation and
  2. To formulate definite hypotheses and to recall general rules or principles that may apply.

III. Get them to *evaluate* carefully each suggestion by encouraging them

1. To maintain an attitude of unbiased, suspended judgment or conclusion,
2. To criticize each suggestion,
3. To be systematic in selecting and rejecting suggestions, and
4. To verify conclusions.

IV. Get them to *organize* their material so as to aid in the process of thinking by encouraging them

1. To "take stock" from time to time,
2. To use methods of tabulation and graphic expression, and
3. To express concisely the tentative conclusions reached from time to time during the inquiry. (This topic will be discussed more fully in the second section of the chapter.)

Four types of opportunities for students to do reflective thinking. — The opportunities which are provided for students to do reflective thinking, and which the teacher may use, can be classified as follows:

1. Opportunities for the student to do his own reasoning, that is, to reason independently.

2. Opportunities to follow and supplement the reasoning of other students.

3. Opportunities to follow and supplement the reasoning being done by the teacher.

4. Opportunities to follow and supplement the reasoning set forth in a book.

There are two principal questions to be considered in connection with each of these opportunities: One is the question of time and the other is the question of value.

1. *In independent reasoning much time is needed for "scrapped" thought.* — As suggested in the descriptions by Whewell and Galton of reflective thinking (see pp. 180–183), in reaching the solution of a problem there is an enormous amount of waste thought even by such geniuses as Kepler. Hundreds of suggestions come to mind which are not pertinent or helpful and which must be evaluated and rejected. All this takes time, but if an individual is to do his own

reasoning, the time and opportunity for this waste, or "scrapped," thought must be provided. If this is done in the school, it means that the student must have occasions to work by himself, to solve his own problems, and that he must not be expected to cover nearly the amount of ground that is ordinarily laid down in the course of study.

There are extremists who argue that all education should consist of this process of discovery by the student. Rousseau in his "Émile" and Herbert Spencer in his chapter on Intellectual Education have presented the best-known appeals in favor of this practice. There is no doubt that superior training may be secured from individual research by the student, stimulated and guided by the teacher. Consequently a certain amount of this type of work should be provided in the form of individual problems to be worked out by laboratory or library investigations or merely by reflective thinking about the problems.

2. *Group reasoning. Bright students achieve; slow ones benefit less.* — But profit from the experience of others as well as training in reflective thinking can be secured if the other opportunities noted above are also utilized. Thus, if a problem is being worked out by a class as a group of thinkers, each individual student may be stimulated and held responsible for contributing to and appreciating the solution. As a result of the greater fertility of suggestion resulting from the larger number of minds, the problem may be solved in a shorter time and yet the essentials of the whole process of reflective thought may be retained. The greatest difficulty for the teacher is to make sure that every individual participates and contributes as he should. There is danger that only the more rapid thinkers will make suggestions and evaluate them, and that the slower members of the class will simply observe the results. Even if this is the case, however, the slower ones may profit somewhat from observing the process by which the problem is solved. Moreover, even though they do not

forge ahead with suggestions and evaluations, they may still be "in the running" and profit from the experience.

Teacher must allow pupils to evaluate their suggestions.— In directing this type of group thinking, certain dangers which the teacher should avoid are suggested by Dewey in the following quotation:

> The inductive inference, the guess, is formed by the student; [ordinarily], if it happens to be correct, it is at once accepted by the teacher; or if it is false, it is rejected. If any amplification of the idea occurs, it is quite likely carried through by the teacher, who thereby assumes the responsibility for its intellectual development. But a complete, an integral, act of thought requires that the person making the suggestion (the guess) be responsible also for reasoning out its bearings upon the problem in hand — that he develop the suggestion at least enough to indicate the ways in which it applies to and accounts for the specific data of the case. Too often . . ., after calling out the spontaneous reflections of the pupils (their guesses or ideas about the matter), [the teacher] merely accepts or rejects them, assuming himself the responsibility for their elaboration. In this way the function of suggestion and of interpretation is excited, but it is not directed and trained. (**5**: 97–98)

3. *Usually only bright pupils profit from following teacher's reasoning.* — The third type of opportunity for reflective thinking, namely, following the reasoning done by the teacher, is probably of little value from the standpoint of training in thinking except for the superior students who approximate the teacher in reasoning capacity. For the mediocre or poor student, merely observing the teacher's activity does not provide training in reasoning any more than watching a play trains him in acting. He gets some training from it, but not much. The superior student, on the other hand, may be trained by following the teacher's reasoning. For one thing, he thinks much faster than the teacher talks; consequently he is anticipating the teacher by silent suggestions and

evaluations. A comparison of these with those made by the teacher shows him whether he is right or wrong. Moreover, he probably not only follows the teacher's reasoning but observes as well the latter's method, and then either consciously or unconsciously imitates it or, if he thinks it is a poor one, may purposely avoid it. The total amount of training received by a class from following the teacher's reasoning is probably too small to make this an important basis for such training except in the case of advanced or superior students.

4. *Properly constructed books may provide good opportunities for reasoning.* — The fourth kind of opportunity for training in reflective thinking, namely, following and supplementing the reasoning outlined in a book, has possibilities that are not generally appreciated. It is generally assumed that a book provides primarily opportunities for acquiring information, but the possibilities of providing also for training in reasoning approximate in some subjects the possibilities of providing for the independent individual reasoning discussed above (p. 200, § 1). An excellent example of such a book is the textbook on economics from which a quotation was made at the beginning of this chapter (see p. 172). Another good example is E. L. Thorndike's "Principles of Teaching," in which two thirds of the book is taken up with exercises intended to give students training in thinking about problems of teaching. Other examples of books which tend to provide for reasoning instead of mere acquisition of facts or ideas are the recent "suggestive" geometries, which place the emphasis upon the solution of exercises instead of on the memorizing of proofs of propositions. One of the best arguments in favor of this tendency is found in A. Schultze's "Teaching of Mathematics in Secondary Schools." It reads in part as follows:

> *The most common error of geometric instruction is the fact that the knowledge of book demonstrations is made the chief object of the study.*

> The study of geometry should be primarily a course in the solution of originals and general methods of attack. The regular textbook propositions should be treated as exercises, with this difference, that the facts stated by them should be remembered.
>
> Exercises, however, should be studied not in order to be remembered but in order that the student may familiarize himself with geometric working methods, which will enable him to do other and more complex reasoning.
>
> The student's ability and progress in the subject can be measured only by his ability to solve exercises that are original to him, and not by his ability to repeat well-known facts. (**21** : 103)

This quotation suggests not only the possibility of organizing geometry books in which problem-solving is emphasized, but also calls attention to the fact that the ordinary methods of teaching the subject do not give exercise in reasoning, but simply require the memorizing of a series of statements.

Kind of mental activity determined by method, not by subject matter. — These facts concerning the teaching of geometry suggest the general principle that the character of the subject matter does not necessarily assure a certain type of mental activity on the part of the pupil. Often it is the method of teaching the subject matter which determines the type of mental activity. The same point is well illustrated in the teaching of natural science, which, like geometry, has ordinarily been supposed to train in reasoning. The distinction between learning the body of scientific subject matter and using methods of scientific reasoning has been discussed at length by Dewey (**13** : 121–127) and Karl Pearson (**19** : 9–12). It has already been considered in this book in connection with the distinction between the logical and psychological methods of organizing subject matter. (Review page 91.)

Summary of problem-solving aspect of reflective thinking. — This will conclude our discussion of the first phase of reflective thinking, namely, problem-solving. We have considered the opportunities for problem-solving which occur in various subjects; the types of problems with which persons are confronted in ordinary life; the nature of the process of reflective thinking in solving problems; the methods which a teacher might use in stimulating and assisting pupils in solving problems; and the relative value of independent reasoning by the individual pupil as compared with reasoning as a member of a group, or following and supplementing the reasoning of the teacher, or solving a series of problems outlined in a book.

In the next section of the chapter we shall take up reflective thinking from a slightly different point of view, namely, from the standpoint of the part played in reflective thinking by the process of acquiring clearly defined abstract and general meanings or ideas.

SECTION II. ACQUIRING ABSTRACT AND GENERAL MEANINGS

Plays a large part in high-school instruction. — Closely related to the first phase of reflective thinking which we have been considering, namely, problem-solving, is the learning of abstract and general meanings. This process plays a very large part in high-school instruction. This may be illustrated by the following list of a few of the general or abstract terms, the meanings of which are learned in high school or in the upper grades of the elementary school.

In linguistic studies: ablative, accordance, appositive, concession, conditional subjunctive, diæresis, ellipsis, genitive, gerund, hyperbole, metonymy, moods, pleonasm, pluperfect tense, vocatives.

In mathematics: abscissa, binomial, conditional equations, constants, coördinates, determinant, exponents, geometric progression, indeterminate equations, logarithms, mean proportional, reciprocal, surd.

In physics: aberration, acceleration, adhesion, capillarity, centrifugal, conduction, dialysis, diathermous, diatonic, endosmose, index of refraction, viscosity.

In botany: absorption, adaptation, bacteria, chloroplasts, chromosomes, fertilization, palisade cells, parthenogenesis, tropism, xerophytes.

Similarly, in chemistry, economics, psychology, and other subjects there are hundreds of abstract or general meanings which must be learned in order to understand the discussions or to do reflective thinking in the various subjects.

Examples of general propositions studied. — In addition to the meanings of single terms there are many abstract and general propositions, statements, rules, or laws that have to be studied, understood, and learned. Examples of these are the following:

From grammar: A verb agrees with its subject in number. In German "the subjunctive mode is used in all conditional sentences when the supposition is contrary to fact, and it occurs in both the condition and the conclusion."

From mathematics: To reduce a fraction to its lowest terms, divide both its numerator and its denominator by all of their common factors or by their highest common factor.

From physics: The value of the greatest resistance that can be overcome with a combination of pulleys is obtained by multiplying together the effort that is applied and the number of cords that support the movable pulley.

From botany: It has been observed that the chloroplasts in these palisade cells are able to assume various positions in the cell, so that when the light is very intense, they move to the more shaded depths of the cell, and when it becomes less intense, they move to the more external region of the cell. The stomata, or breathing pores, which are developed in the epidermis, are also great regulators of transpiration.

Contrasting methods used in textbooks. — As we examine the various methods of teaching abstract or general meanings and propositions which are used in textbooks, we find striking differences. For example, contrast the two following quotations from chemistries, which are intended to teach the meaning of *chemical change*.

> The matter of the universe is constantly changing. Sometimes the change temporarily modifies the special properties of the matter under examination, but often the change is permanent and another substance or kind of matter is the result. When the properties of a given portion of matter are so changed that a different kind of matter is formed, then the change is called a *chemical change*. If the properties are temporarily changed, then the substance has undergone a *physical change*. (**18** : 15)

The second example of methods of teaching the meaning of *chemical change* reads as follows:

> *Introductory*. Those things which are most familiar to us are apt to be regarded with least wonder and to occasion the least thought. Take, for example, the changes included under the head of fire. Unless we have studied these changes with care, what can we make of them? We see substances destroyed by fire. They apparently disappear. We feel the heat produced by the burning. We know that this heat disappears, and we have nothing left in the place of the substance burned. Take as another example the rusting of iron. We all know that iron when exposed to moist air undergoes a serious change, becoming covered with a reddish-brown substance which we call rust. If the piece of iron is comparatively thin and it is allowed to lie in the air long enough, it will be completely changed to the reddish-brown substance and no iron as such will be left. If a spark is brought in contact with gunpowder, there is a flash and the powder disappears, dense smoke appearing in its place. What are the causes of these remarkable changes? Can we learn anything about them by study?
>
> *Chemical changes*. In those changes which have been referred to, the substances changed disappear as such. After the fire, the wood or the coal or whatever may have been burned is no longer to be found. The gunpowder after the flash is no longer gunpowder. The rusted iron is no longer iron, and no matter how long the rust is allowed to be unmolested, it will not return to the form of iron.

Iron may, further, be changed by contact with other substances than air so as to lose its properties. Strong vinegar, which contains the substance known to chemists as acetic acid, acts upon iron, causing it to lose its characteristic properties. . . . Changes of this kind, in which the substances disappear and something else is formed in their place, are known as *chemical changes*. . . .

Physical changes. There are many changes taking place which do not affect the composition of substances. Iron, for example, may be changed in many ways and still remain iron. It may become hotter or colder. . . . (**20**: 1–2)

Method based on common characteristics of familiar examples. — These two examples quoted above furnish us with two typical methods of teaching the meaning of new abstract or general terms. The first quotation is itself phrased entirely in general terms and gives no familiar examples. The second quotation, on the other hand, (1) begins with familiar examples, (2) uses them to bring out a common characteristic (namely, a certain type of change in substances), and (3) provides at the end of the process the technical term *chemical changes* as a means of designating, thinking about, and talking about the characteristic aspect of the situation which has been under discussion.

Example of exercises to test grasp of meaning. — Another type of procedure in teaching the meaning of abstract or general terms is to give a preliminary discussion consisting of a few familiar examples, with a statement of the definition, and then to provide a number of exercises in thinking, which are expected to be effective in making the meaning clear. This procedure is illustrated by the following quotation from a textbook on psychology, although no definition is given in this case.

I. *Mental Facts*

The world is made up of physical and mental facts. On the one hand there are solids, liquids, and gases, plants, trees, and bodies of animals, the stars and planets and their movements, the winds and the clouds, and so on through the list of physical things and their movements. On the other hand are the thoughts and feelings of men and of other animals: ideas, opinions, memories, hopes, fears, pleasures, pains, smells, tastes, and so on through the list of states of mind. . . . Psychology, the science of mental facts or of mind, deals with the latter.

EXERCISE

Which of the following words refer to mental facts? Which refer to physical facts? Which refer sometimes to mental and sometimes to physical facts?

Gas, tree, sympathy, money, desire, wish, dog, stone, dreams, headache, inventiveness, inch, pound, taste, intelligence, heavy, sour, oxygen, electricity, fatigue, pleasure, loud, observe, remember, image, teeth. (**23** : 1–2)

Example of students being assisted and required to discover meanings. — Finally, a fourth type of procedure is illustrated by the following quotation from the "Outlines of Economics" (see above, p. 171), in which the student's attention is called to certain familiar examples and he is then required to work out the answers to questions in order to discover the meanings for the terms under consideration.

II. *Means of Satisfying Wants*

Means of satisfying wants are called goods. Goods, which may be material or nonmaterial, are characterized by the quality of utility — the capacity to satisfy wants.

The following diagram suggests a descriptive classification of goods:

Means of satisfying wants — goods	Economic goods (have utility, are scarce and appropriable)	Material (wealth)	
		Nonmaterial (services)	
	Free goods (have utility)	material nonmaterial	The economist does not concern himself with these

Questions

1. Does every good possess utility? Is everything which possesses utility a good?

2. Have the following utility: whisky, a gambler's pack of cards, clothes of an obsolete fashion, opium, grand opera, air?

3. Which has the greater utility, a diamond or a barrel of flour? the rare first edition of an old book or a modern copy, better printed and better bound? Why?

4. Are the following appropriable: (*a*) a loaf of bread; (*b*) a coal mine; (*c*) sunshine; (*d*) the Mississippi River; (*e*) a public park; (*f*) a band concert? What is meant by *appropriable*?

5. Give examples of nonmaterial economic goods, of nonmaterial free goods, and of material free goods.

6. Should the economist be as much concerned with nonmaterial as with material economic goods? Can we say that one class is more important than the other?

7. Make a list of things which are clearly wealth.

8. Make a list of things which are clearly not wealth.

9. Make a list of things concerning which you are in doubt as to whether they are wealth.

10. Define wealth.

11. Are the following wealth: an ocean steamship; a pleasure yacht; a ship on the bottom of the ocean; gold in the mine; gold to a shipwrecked sailor on a desert island; a wooden leg; health; eyesight; a waterfall; a head full of useful knowledge; water?

12. "A thing may be wealth though it is not useful—for example, an Indian arrowhead." Comment.

13. Is an encyclopedia wealth? among Indians?

14. Could a thing that was wealth at one time cease to be wealth at some other time? Could the reverse be true? Why?

15. If a coat should go out of style, would it still be wealth?

16. What distinguishes wealth from services?

17. Should we consider services which have a tangible result more important than those which do not? Give several illustrations of each kind.

18. From the point of view of the economist, could you accept as a definition of wealth (*a*) means of satisfying wants; (*b*) things

which make for welfare; (*c*) material means of satisfying wants; (*d*) material things upon which labor has been expended?

19. Are the following wealth: a courthouse; a warship; a city hall; a public library?

20. How do you distinguish between social wealth and private wealth? Does social wealth include more than private wealth?

21. When a United States gold certificate is destroyed, is wealth destroyed?

22. Is a railroad bond wealth? Is a patented invention? a fire-insurance policy?

23. Suppose a new source of mechanical power should become available at one fourth the cost of steam power. What would be the effect on wealth in general? Would any individuals be made less wealthy by the new discovery?

24. If wealth increases, will there be greater well-being? What is the relation of wealth to well-being?

25. "To be wealth a thing must be scarce." Is that equivalent to saying that the less we have of things, the better off we are? What do you mean by *scarce*?

26. Is a man's wealth measured by the number or bulk or weight of his possessions or by their money value? Is a scarce article likely to command a higher price than one that is common? Does this imply that wealth is increased by scarcity of goods?

27. Should you accept as true the statement that the scarcity of certain desirable articles, such as jewels, may enhance the comparative wealth of an individual, but that general welfare is promoted by abundance of the commodities which people desire? Why? (**17**: 4–6)

An excellent opportunity for comparing three lessons of different types on the same topic is afforded in Thorndike's "Principles of Teaching" (pp. 167–170). The topic is *Tense* in grammar. (1) The first lesson merely gives the definitions, with few examples, and at the end provides a list of questions. The answers to these are the statements in the paragraph that has preceded them, in exactly the same order. Such a lesson merely provides for the verbatim learning of general statements that are not understood. (2) The second lesson gives examples first, then the names of the various tenses and some abstract discussion of inaccuracies in using some of the technical terms, such as *present tense*. (3) The third lesson begins with familiar examples and sets questions which require the student to discover the various ways in which verbs may be used to indicate differences in time. It then gives the technical terms to designate the different tenses and provides practice in picking out and using verbs in different tenses.

General questions concerning best method to use. — All of these examples of methods which we find used in the textbooks to teach abstract and general meanings and propositions suggest the following questions for consideration in connection with this type of learning:

1. What is the value of familiar examples or illustrations?

2. What is the value of analytical discussion by the teacher versus analytical study and discovery by the pupils?

3. What is the value of a definition? Is it necessary? Should it come before or after the meaning has been acquired? Should it be phrased in technical language or in ordinary language?

4. Of what value are exercises which test the student's understanding of the new abstract meaning and his ability to recognize and use the same in new situations?

Untutored method of learning may contain suggestions. — A brief discussion of the way in which general meanings or abstractions are acquired in ordinary life may throw some light on the best procedure to be followed in teaching. I say *may* because the best or most economical and effective process of learning under instruction might differ very greatly from the natural, untutored process.

Abstracting is a process of selecting a single aspect for separate attention. — For our purposes the process of abstraction or abstracting may be thought of as getting acquainted with some aspect of a situation apart from its other aspects. The discussion of the meaning of *chemical changes* given above would serve as one example. In that discussion the attention was directed to one phase of various situations (iron rusting, powder exploding, etc.), namely, the phase "change of substance." This phase may be spoken of as the *abstracted element*. The ordinary meaning of the term *to abstract*, namely, "to withdraw," "to separate," "to take away," suggests the character of the psychological process. The abstracted element is also spoken of as *general* because it is (or similar manifestations are) found in many situations or because knowledge of it may be used in various situations. Thus, chemical change may be an abstracted aspect of one situation or of many situations.

Learning the bacterial aspects of water is an example. — As an example of learning a new abstraction in ordinary life we may imagine a party of canoeists who are choosing a camping site in a country where there are a number of mining camps, and are considering whether water from a certain brook is fit to drink. Various characteristics of the water may be taken up in turn for consideration. Each of these may be considered as an abstracted element. One person might focus his attention on pieces of bark or leaves floating in the water and say it was unfit on that account. Another might select its murkiness as the aspect for emphasis. Another might emphasize its coolness. A sanitary engineer might disregard all of these and say that the only aspect of importance is whether the water contains germs of disease, and hold that the thing to do is to trace it to its source or to examine the possibility of the watershed being contaminated.

For some member of the party the idea "germ aspect of water" may be a new abstraction — one that has never been brought to his attention before. Perhaps he has never heard before of germs or of the part played by them in disease. In this case we have the beginning of the process of learning a new abstraction. If he is not particularly inquisitive, he may not ask any questions, and his notion of the abstracted element "disease germs" remain simply "what the sanitary engineer said about that brook water." Later in his life another reference to disease germs may be experienced; perhaps he will read in a sign in the street cars that "spitting is dangerous; it spreads disease germs." He may then recall the statement about the brook water and have now a conception of "germs in brook water and spread by spitting — dangerous." Gradually, as he has more experiences, he may get a fairly good conception of disease germs, from the standpoint of practical behavior, as "things to be avoided." He may have, however, no acquaintance with them as existing separately; they are simply abstract aspects of various situations, such as drinking water, sputum, milk, tuberculosis, etc. They are simply aspects that he has heard talked about; he has no clear notion of them as objects; he does n't know what they look like, how they live, how they grow and subdivide, whether they are plants or animals or minerals; yet for practical purposes he may have a fairly adequate conception of them.

School expedites process and stresses technical meanings. — The above description is typical of the way in which we acquire many of our abstractions, or general notions in daily life. When we come to consider the acquisition of these abstractions in school, however, we are met by two differences: (1) It is desirable to shorten the time for learning the abstraction; hence experiences containing the aspect in question are usually presented in fairly rapid succession. (2) Most teachers think that it is important to proceed at once to teach the conception of the abstracted aspect that the scientist has who specializes in the related field.

May expedite by intensive study of a few typical examples. — The expediting of the process of learning abstractions, by seeing that the student gets, in a brief, condensed period of time, experiences which would otherwise be scattered over a long period, is one of the chief functions of the school. It has led, however, to the danger of assuming that the all-important thing is the providing of a *large number* of experiences or examples, from which it is expected that the student will derive an adequate conception of the abstracted element. It is probably more effective to increase and then condense the experiences by providing for an intensive study of a *few* cases, with their manifold relationships and ramifications, than to spend the same amount of time on the superficial study of a large number of cases.

To continue to use the example about the party of canoeists and the disease germs in the brook water, if the sanitary engineer desired to give the other members of the party a better notion of germs, or bacteria, he might pursue the matter as follows: Suggesting that mining camps are located on some of the brooks but not on others, he might lead them to explore the watershed to determine which brooks were probably safe and which were not. He might then take samples of water from a safe brook and an unsafe one and ask members of the party to call at his office next day to look at them under the microscope. He might then succeed in demonstrating the presence of the colon bacillus as a sign of the presence of human excreta in the unsafe water. From experience he could cite examples of epidemics clearly due to contaminated water supply, and could show, by means of data concerning decreased typhoid rate, the beneficial results of installing city systems to provide filtered, or pure, water. Then other phases of camping which involve bacteria could be brought in, such as the use of canned milk, the effects of flies, the necessity of disposing of the garbage, the care of wounds. Thus, always taking as his point of departure some familiar, real, and typical situation, it would be possible to bring about a fair understanding of the practical aspects of bacteriology in relation to health.

Psychological justification of the type method. — The psychological principles at the basis of this intensive study of typical cases are presented by Dewey as follows:

> In the process of comparison the teacher must avert the distraction that ensues from putting before the mind a number of facts on the same level of importance. Since attention is selective, some one object normally claims thought and furnishes the center of departure and reference. This fact is fatal to the success of the pedagogical methods that endeavor to conduct comparison on the basis of putting before the mind a row of objects of equal importance. In comparing, the mind does not naturally begin with objects a, b, c, d, and try to find the respect in which they agree. It begins with a single object or situation more or less vague and inchoate in meaning, and makes excursions to other objects in order to render understanding of the central object consistent and clear. The mere multiplication of objects of comparison is adverse to successful reasoning. Each fact brought within the field of comparison should clear up some obscure feature or extend some fragmentary trait of the primary object.
>
> In short, pains should be taken to see that the object on which thought centers is *typical*; material being typical when, although individual or specific, it is such as readily and fruitfully suggests the principles of an entire class of facts. No sane person begins to think about rivers wholesale or at large. He begins with one river that has presented some puzzling trait. Then he studies other rivers to get light upon the baffling feature of this one, and at the same time he employs the characteristic traits of his original object to reduce to order the multifarious details that appear in connection with other rivers. This working back and forth preserves unity of meaning while protecting from monotony and narrowness. Contrast, unlikeness, throws significant features into relief, and these become instruments for binding together into an organized or coherent meaning dissimilar characters. The mind is defended against the deadening influence of many isolated particulars and also against the barrenness of a merely formal principle. Particular cases and properties supply emphasis and concreteness; general principles convert the particulars into a single system. (**5**: 210–211)

Examples of the type method with exceptions. — Practical examples of the *type* method advocated in this quotation have already been described in connection with the selection of subject matter. (Review pages 74–78 above.) The examples of general meanings cited there ("Italian humanist," "irrigation projects," and type forms in zoölogy and botany) are all cases where new experiences need to be provided in considerable quantity; hence the type method is especially effective. In some cases, however, such as the meaning of *chemical changes*, where the student already has a wealth of experiences upon which to draw and the element in question can be abstracted very quickly in each case, the teacher would be justified in presenting a number of examples in rapid succession, instead of presenting one typical example at great length.

1. Particular personal experiences a necessary basis for abstractions.[1] — To return now to the four questions of method raised on page 212, we may note first the necessity of particular personal experiences as the basis of learning general or abstract meanings. In discussing this point, Dewey says:

> A blind man can never have an adequate understanding of the meaning of *color* and *red*; a seeing person can acquire the knowledge only by having certain things designated in such a way as to fix

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[1] The phrase "proceeding from the concrete to the abstract" is often used in connection with the discussion of learning abstractions, but unfortunately its meanings remain so various, even after it has been carefully studied, that it is probably advisable not to use it at all. It is often used as synonymous with "proceeding from the particular to the general." But Dewey points out that unless the particular is familiar it may not be concrete, and that general terms, such as *atom* or *molecule*, which are very familiar to a physicist, are concrete for him. Dewey presents other refinements of the meanings of *concrete* and *abstract* which are so puzzling as to justify us in leaving out the word *concrete* altogether as the opposite of *abstract*, and saying *particular fact* when that is what we mean, *familiar fact* when that is what we mean, etc. (See **5**: 135–144)

attention upon some of their qualities. This method of delimiting a meaning by calling out a certain attitude toward objects [the attitude of disregard for some qualities and selection of others] may be called *denotative* or *indicative*. It is required for all sense qualities — sounds, tastes, colors — and equally for all emotional and moral qualities. The meanings of *honesty*, *sympathy*, *hatred*, *fear*, must be grasped by having them presented in an individual's first-hand experience. . . . However advanced the person is in knowledge or scientific training, understanding of a new subject or a new aspect of an old subject must always be through these acts of experiencing directly the existence or quality in question. (**5**: 132)

Advanced teachers fail to appreciate the necessity of particulars. — The danger of advanced teachers overlooking this necessity of detailed personal experience, together with the psychological explanation of the fact, is brought out by James in the following quotation:

As the art of reading (after a certain stage in one's education) is the art of skipping, so the art of being wise is the art of knowing what to overlook. The first effect, on the mind, of growing cultivated is that processes once multiple get to be performed by a single act. Lazarus has called this the progressive condensation of thought. But in the psychological sense it is less a condensation than a loss, a genuine dropping out and throwing overboard of conscious content. Steps really sink from sight. An advanced thinker sees the relations of his topics in such masses and so instantaneously that when he comes to explain to younger minds, it is often hard to say which grows the more perplexed, he or the pupil. In every university there are admirable investigators who are notoriously bad lecturers. [One] reason is that they never spontaneously see the subject in the minute, articulate way in which the student needs to have it offered to his slow reception. They grope for the links, but the links do not come. Bowditch, who translated and annotated Laplace's "Méchanique Céleste," said that whenever his author prefaced a proposition by the words "it is evident," he knew that many hours of hard study lay before him. (**6** Vol. II: 369–370)

Expository teaching based on previous real experiences. — After individuals have accumulated a stock of real, personal experiences, it is often possible to build up new meanings from these in an indirect or expository way. Dewey describes this method as follows:

> Given a certain store of meanings which have been directly or denotatively marked out, language becomes a resource by which imaginative combinations and variations may be built up. A color may be defined, to one who has not experienced it, as lying between green and blue; a tiger may be defined (that is, the idea of it made more definite) by selecting some qualities from known members of the cat tribe and combining them with qualities of size and weight derived from other objects. Illustrations are of the nature of [such] expository definitions; so are the accounts of meanings given in a dictionary. By taking better-known meanings and associating them, the attained store of meanings of the community in which one resides is put at one's disposal. But in themselves these definitions are second-hand and conventional; there is danger that, instead of inciting one to effort after personal experiences that will exemplify and verify them, they will be accepted on authority as substitutes. (**5**: 132)

Recalled real experiences sometimes more useful than new experiences. — The danger which Dewey mentions in the last sentence should not blind us to the large possibilities which lie in this indirect or expository method of teaching new abstract or general meanings. It possesses enormous possibilities in many subjects and is illustrated in the example of teaching the meaning of *chemical changes* and *physical changes* described above. In this case most students already possess a thoroughly adequate store of real experiences. All that is necessary is to revive these in imagination and examine them from a new point of view. Many teachers, in their reaction against the teaching of mere words that are not understood, have gone to the extreme of providing laboratory work, pictures, excursions, etc. in cases where they are not necessary.

The meaning which is to be taught could often be reached more economically and by more real reflective thought on the part of the pupil by recall and reconstruction of familiar experiences. This process possesses the additional advantage of keeping the meaning related to the everyday affairs instead of connecting it merely with artificially produced laboratory conditions. Students very often fail to appreciate the fact that the general and abstract meanings acquired in laboratory courses are exampled in daily life.

2. Active discovery and expression necessary for poor students. — The account since page 217 has concerned largely the extent to which real experiences are necessary as a basis of acquiring an adequate understanding of abstract and general meanings. The second problem noted on page 212 concerned the relative merits of analytical discussion by the teacher and analytical thought by the pupils. Practically the same distinctions apply here as were stated on pages 202–203 in connection with problem-solving. The superior student will probably get the meaning adequately by following the discussion by the teacher or in the textbook, provided this is properly related to particular and familiar experiences. The poor student will need to have opportunities to analyze, to discover, to express himself, and to be corrected.

3. Exact definitions. *Not necessary in all thinking.* — The third problem raised on page 212 concerns the place and value of an exact definition of an abstract or general term in learning its meaning. The first point to notice in this connection is that a person may have a very usable meaning for a term and not be able to define it in exact language. Thus, Welton says:

> It is . . . clear that inability to give a precise definition is by no means a sign of inability to think and speak correctly and intelligently of the matter in hand, so far as we require to do so in ordinary life. Many people are surprised to find they cannot give an accurate definition of such common terms as *table* or *cow* if they

> are called upon to do so. It does not follow that they know nothing about tables and cows. They may even be carpenters or graziers and so know a great deal about them, and yet be unable to define their names, though they could give a more or less full and accurate description of the things to which the name applies. (**8**: 228)

An example of this fact is the meaning of *bacteria*. In the incident described above on page 213 the canoeist was supposed to acquire the same practical conception of bacteria that a large part of the general public has at the present time. Yet in neither case is the scientific definition known. It is doubtful whether the definition which is given below would contribute very much to the practical value of their conception.

> *Bacterium*. A microscopic vegetable organism, belonging to the class Algae, usually in the form of a jointed rodlike filament, and found in putrefying organic infusions. Bacteria are destitute of chlorophyll and are the smallest of microscopic organisms.

Further examples are given by Welton, who says:

> Similarly, a child would probably not receive much assistance in understanding what *network* is from the definition given by Dr. Johnson: "anything reticulated or decussated at equal intervals, with interstices at the intersections." Such examples make it clear that a pedantic insistence on definition may do much to hinder the comprehension of meaning. . . . To see a net and think out its purpose gives more content to the idea than to learn not only such a definition as that of Dr. Johnson but any definition that could in all probability be framed. (**8**: 233)

Exact definitions necessary in using technical terms. — Keeping in mind these preliminary cautions concerning the overemphasis on definitions, let us consider briefly the necessity and value of exact definitions in some cases. The discussion of the meaning of the word *concrete*, given above on page 217, furnishes a good example. For ordinary discourse the vague meaning of this term which is current is sufficient. When we come to a scientific issue, however, such as the pedagogical principle of proceeding from the concrete to the abstract, it is evident that a much more exact defining of the term is necessary. Similarly with many other pedagogical formulæ. "Development of faculties" is one of these. This phrase is used in four different senses in pedagogical discussions: namely, as meaning (1) the *appearing* of an instinct or capacity, such as the instinct to walk; (2) the natural *maturing or inner growth* of an instinct or capacity, such as the change in a boy's voice at adolescence; (3) the *training* of a *special* capacity, such as multiplication in mathematics; (4) the *training* of some *general* capacity or power, such as the judgment or the memory. When one reads that "the aim of education is the development of faculties" he cannot be sure which of these meanings of development is intended. The term *appreciation* furnishes another example. In pedagogical discussions this term is used vaguely and often indiscriminately to designate both *æsthetic enjoyment* and *logical understanding* — two processes which are very different. Yet it is often impossible to tell from the context in a given case which meaning the author has in mind. Concerning such a situation Dewey says:

> A constant source of misunderstanding and mistake is indefiniteness of meaning. Through vagueness of meaning we misunderstand other people, things, and ourselves; through its ambiguity we distort and pervert. . . . Vagueness disguises the unconscious mixing together of different meanings, and facilitates the substitution of one meaning for another, and covers up the failure to have any precise meaning at all. It is the aboriginal logical sin — the source from which flow most bad intellectual consequences. (**5**: 129–130)

Technical meanings secured by arbitrary restriction. — It is in the study of such subjects as grammar, mathematics, physics, chemistry, biology, economics, psychology, law, etc. that the exact definition of terms as they will be used in each specialized field is especially important. Within each subject, more or less arbitrary restrictions are placed upon the meanings of the technical terms used, in order that they may always have the same significance. The following terms illustrate the contrast between the loose, inclusive meaning of a given term in ordinary conversation and the restricted meaning of the same term in a given science: *In geometry:* line, surface, square, circle. *In psychology:* sensation, feeling. *In economics:* wealth. *In physics:* work, sound, heat, temperature, mass. In order that the student may think clearly and progress surely in these subjects, it is almost absolutely necessary that he learn the exact definitions of these words. Thus, instead of confusing *mass* with *volume* he must learn that "*mass* means the quantity of matter that a body contains." In psychology, instead of using *sensation* vaguely for almost any kind of experience, he must confine it to "consciousness of qualities or conditions either of things or of one's own body."

Clearness and precision are attributes of good definitions. — In formulating a definition it is important to phrase it in such language that it can be easily understood and at the same time be precise or true to the facts. That is, *clearness* and *precision* are two of the most important qualities of good definitions. A good example of lack of clearness is the definition of *network*, quoted above on page 221. It is often difficult to secure a definition that is clear and at the same time precise. For example, consider the following definition: "To multiply one number, called the multiplicand, by another, called the multiplier, is to use the multiplicand as we must use unity to obtain the multiplier." This definition may be precise, but its meaning must be puzzled out by the high-school pupils. In reaching this definition the author of the algebra from which it is quoted criticizes the ordinary simpler definition in the following words:

> Multiplication has been defined in arithmetic as the process of taking one number, called the multiplicand, as many times as there are units in the other, called the multiplier. It is evident that this

definition holds only when the multiplier is a whole number, and fails when it is a fraction.

Thus, to multiply 7 by 2½ would mean to take 7 as many times as there are units in 2½, that is, 2½ times. This is impossible. One cannot do a thing 2½ times. (**22**: 3)

Get the meaning first, then add the symbol. — One further point in connection with definitions remains to be noted. This is the possibility of reversing the usual form of statement and giving the meaning, or *a* meaning, first and adding the term at the end. To take an example that is easily understood, consider the first teaching about nouns in the elementary school. At first only names of common objects are taken up. The children get an idea of this class of words, that is, names of objects. The teacher now wishes to introduce the technical term *noun*, in order to have a symbol for talking about this class of words and to help the children in thinking about it as a class. She ordinarily does this by giving the definition in this form: "Nouns are names of things." But this is objectionable, since the statement is not precise or true. The difficulty would be obviated, however, if she began with a statement of the general meaning which the children have acquired, that is, "names of things," and then added the new symbol *nouns*. The statement would then stand "Names of things are nouns." In this form it is simple; it represents adequately the meaning which the children have acquired; it is true; and it can be expanded to include other kinds of nouns as these are learned. Unfortunately the form of statement which we find in a dictionary has influenced our practice so much that in many simple cases teachers will struggle to construct a complete definition, which is necessary when the term to be defined comes at the beginning of the statement, instead of being satisfied for the time being with an incomplete statement in the form suggested. Moreover, the ordinary practice distorts the purpose of the term, or symbol, at the stage of learning that has been reached. Its purpose is to make definite and portable a meaning that has been worked out. The stress should be placed on *this* meaning rather than on the *more complete* meaning which may be developed *later*. If the practice advocated here is followed, there will be less memorizing of definitions as mere words without meanings.

Generalizing is a constant process, not a final step. — In this connection it may be noted that a somewhat similar practice should prevail in the learning of general *propositions* and *rules*, as well as in learning abstract and general *meanings*. Unfortunately the idea is often implied, in books on methods of teaching, that *generalization* is almost the last step in the process of reaching a refined and exact general meaning or conclusion. The opposite and true notion is expressed by Dewey as follows:

> Generalization is not a separate and single act; it is rather a constant tendency and function of the entire discussion or recitation. Every step forward toward an idea that comprehends, that explains, that unites what was isolated and therefore puzzling, generalizes. . . . The factor of formulation, of conscious stating, involved in generalization should also be a constant function, not a single formal act. Definition means essentially the growth of a meaning out of vagueness into *definiteness*. Such final verbal definition as takes place should be only the culmination of a steady growth in distinctness. In the reaction against ready-made verbal definitions and rules the pendulum should never swing to the opposite extreme, that of neglecting to summarize the net meaning that emerges from dealing with particular facts. Only as general summaries are made from time to time does the mind reach a conclusion or a resting place, and only as conclusions are reached is there an intellectual deposit available in future understanding. (**5** : 211)

4. Exercises should test the student's grasp of new meanings. — The fourth question of method raised on page 212 concerned the use of exercises to test the student's grasp of the new abstract meanings or rules. Examples of such exercises are given on pages 209–211. These exercises not only test his understanding of the new idea, but may also broaden this understanding and give practice in using and applying the idea. When these exercises take the form of rather complex problems to be solved, some of the general principles of training in problem-solving which are summarized on pages 199–200 may be applied in the teaching.

Summary of teaching abstract and general meanings. — The general rules for teaching the meaning of abstract and general *terms* which we have been discussing may be summarized as follows:

1. *Experiences of clear-cut typical examples.* — Assure that the students have *real personal experiences of* carefully selected *clear-cut typical examples* which embody or illustrate the meaning or rule that is to be taught.
2. *Active analysis and comparison.* — Require *active analytical study and comparison* of these examples by the students.
3. *Continuous defining.* — Require and aid the students to *keep summarizing* the meaning or rule which they are gradually building up, eventually reaching a clear, precise statement of it.
4. *Practice in using.* — Provide well-selected problems or exercises to give students practice in recognizing and using the new idea in new complex situations.

These principles, together with some of those set forth in the preceding section on problem-solving, may govern the teaching of abstract and general *propositions* such as those set forth on page 206, as well as the teaching of abstract and general terms.

Generalizations aid in solving personal and social problems. — It is desirable to keep in mind the relation of the discussion in this section of the chapter to the whole chapter and to the first section. The whole topic of the chapter is Reflective Thinking. The aspect of this topic which was discussed in Section I was the solution of problems. The aspect discussed in this, the second section, is the acquiring of abstract and general meanings. The chief practical reason for acquiring these meanings is that they may help in solving problems. As James says, "*The whole function of conceiving, of fixing and holding fast to meanings, has no significance apart from the fact that the conceiver is a creature with partial purposes and private ends.*" (**6** Vol. I: 482.) The ways in which general meanings may help in solving problems or attaining the private ends mentioned by James will be discussed briefly in the following paragraph. This is partly a repetition of the discussion on pages 190–192, but from a slightly different point of view.

By identifying a particular problem as an example of a known class.—An abstraction, or general notion, may be used in two ways. First, when confronted by some particular difficulty or problem, if it can be identified as an example of some general class which is already understood, the methods of dealing with it are easily determined. For example, recently it has been discovered that many diseases are transmitted by insects. In connection with this discovery a technique of guarding against and destroying insects has been developed, and the public is being educated to believe in it and use it. Now, in investigating the cause of some particular disease the medical investigator has the advantage of knowing that it may be spread by insects, and he keeps this possibility in mind as he makes his experiments. If he succeeds in discovering and proving that it is carried by a certain insect in a certain way, then the methods that have been developed for handling similar cases may be used. That is, as soon as he can isolate and identify the abstract phase of the disease, "carried by insects in certain ways," he can take advantage of all the general knowledge that has been developed about the class "diseases spread by insects." The notable examples of this class are yellow fever spread by the Stegomyia mosquito; malaria spread by the Anopheles mosquito; typhoid spread partially by house flies; plague spread by rats and fleas.

By inferring the practical corollaries of the general fact. — The second way in which an abstraction, or general principle, may prove useful in reflective thinking is by inferring what further consequences must follow from it. For example, suppose it is shown that original nature (inborn characteristics almost entirely hereditary in character) is a very powerful factor in determining an individual's achievements — that it determines his possibilities and sets definite limitations beyond which he cannot go. Given this as a starting point, the following practical corollaries might be inferred: (*a*) In the choice of vocations the most important thing is to determine first the individual's inborn capacities. (*b*) The school should provide a many-sided curriculum in order to determine students' capacities. (*c*) It should provide opportunities for students to specialize. (*d*) It should have a flexible system of promotion which would not retard a student because of lack of capacity in some special line. (*e*) The improvement of society depends to a large extent on the selection of the better individuals to have descendants. (*f*) Idiots, imbeciles, etc. should not be permitted to have descendants. Thus, starting from a single fundamental general principle, a host of further practical consequences may be inferred.

Summary of discussion of reflective thinking. — Thus we are brought back to the issues with which the chapter opened. The discussion began with an analysis of the part played by problem-solving in everyday life and an account of the provisions for such mental activity in schools. The reflective solution of a problem was then shown to involve the selection, from a mass of associated ideas, of those which seemed to bear upon the problem. Success in this process was shown to depend upon fertility of suggestion, critical evaluation of suggested methods from the standpoint of the problem in hand, and care in organizing the suggestions which were accepted. In connection with the discussion of fertility of suggestion it was shown that the recall of general principles which might apply to the particular case in question is one effective method of solving problems. The ways in which these general principles or abstract and general meanings are learned were discussed in detail in the second section of the chapter, and the pedagogical principles which were developed were summarized on page 226. Finally, examples were given to show how these general ideas, when once acquired, do contribute to the solution of practical social problems.[1]

This will conclude our discussion of the third type of learning, namely, reflective thinking. This is the type that is most difficult to understand, but the one that pedagogical writers have often approached with the most assurance. Some of the books which deal with methods of teaching have been entirely devoted to a discussion of the teaching of lessons involving reflective thinking, and have completely neglected to discuss the other four types of learning which we outlined on pages 96–97 and which are of fundamental importance in social life and in the school. The first of these types of learning which we discussed was acquiring motor skill, as in learning gymnastic feats and acquiring vocal skill. The second type was associating symbols and meanings, especially in the learning of a foreign vocabulary. The third was reflective thinking. In the next chapter we shall take up the fourth type of learning that is to be considered; namely, acquiring habits of enjoyment, which is prominent in the arts and in sports and games.

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[1] Some instructors may wonder at two omissions from this chapter; namely, (1) of the distinction between inductive and deductive thinking, and (2) of the Herbartian five formal steps. The part played by induction and deduction in any example of thinking is so difficult to understand that its introduction into the discussion is of no help to the student. In fact, if Dewey's characterization of induction in connection with the burglar example on page 82 of his "How We Think" is correct, most of the pedagogical discussions use the term *deduction* incorrectly. On the other hand, while the Herbartian formal steps parallel closely the summary given on page 226, they can be discussed to best advantage in Chapter XXI as a method of planning lessons.

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EXERCISES

For problems for class discussion of Chapter IX, plus lesson plans and a complete stenographic report of a model lesson for teaching a new abstract idea, see *Exercises for "Methods of Teaching in High Schools,"* pp. E82–E114.

For similar material on Chapter X, including extensive additions to the bibliography, see pp. E117–E140.

CHAPTER X

FORMING HABITS OF HARMLESS ENJOYMENT

Main points of the chapter. — 1. Since training for enjoyment of leisure time is one of the ultimate aims of education, the methods to be used deserve special consideration.

2. The examples to be discussed include training in the enjoyment of sports and games, clubs and parties, dancing, music, literature, and the drama.

3. In discussing music, literature, and the drama we shall avoid the use of the term *appreciation* in order to avoid confusing the issues.

4. We shall also assume that there is no *necessary* connection between the enjoyment of artistic productions and morality, that is, the desire and endeavor to work for the common good.

5. In all lines of enjoyment the educator must plan to develop such habits as are practiced by ordinary, well-behaved, cultivated people. In literature these include primarily the reading of books of fiction and the serious articles and fiction printed in contemporary magazines.

6. All selections and activities should be within the range of the interests and understanding of the students, and enjoyment should characterize every step of the development.

7. In the case of young people and most adults the relatively primitive forms of enjoyment connected with story, color, rhythm, melody, action, humor, etc. are more important than those related to structure, composition, meter, choice of words, figures of speech, technical analysis, etc. The former are just as good from the moral standpoint as are the latter.

8. Among teachers of English there is a very active radical movement for the humanizing of the study of literature by relating it to everyday interests.

Emotional aspect uppermost in the consideration. — In preceding chapters we discussed three types of learning: namely, acquiring motor skill, associating symbols and meanings, and reflective thinking. In this chapter we shall discuss a fourth type, namely, forming habits of harmless enjoyment or recreation. Examples of this process are found in training in enjoying athletic sports, dancing, music, drama, books, scenery, statuary, paintings, etc. This type of learning is related somewhat to the other types which we have discussed, but in some respects it is obviously unlike acquiring motor skill or a foreign vocabulary or habits of reflective thought. The chief point of difference is in the fact that the emotional element, enjoyment, is the chief factor, the very starting point for all the consideration and discussion.

Already discussed as an aim and in other connections. — The problem of forming habits of enjoyment has already been touched upon in earlier chapters in several connections. In the chapter on the broadening purposes of high-school education, training for harmless enjoyment was included as one of the three fundamental aims of the school, the other two being good will and social efficiency (economic, civic, and domestic) (see p. 17). In the discussion of the proximate aims in the same chapter the points made concerning the development of abiding many-sided interests are also related to the present discussion, since recreational interests, or habitual tendencies to reach out after certain forms of enjoyment, are among the most important of human interests (see p. 22). The habit-forming aspect was also referred to among the proximate aims (p. 20), and some of the general conditions of habit-formation were brought out in the discussions of association (p. 124) and especially of practice or drill (pp. 124–153). In the latter connection the importance of the influence of spontaneous interest as a factor in the effective and economical formation of motor and intellectual habits was emphasized. Since spontaneous interest is so important in forming habits of these types, it is obvious that it must be of even greater importance in forming habits of enjoyment, that is, habits in which the response that is to be connected with a given type of situation is emotional in character.

Widespread recognition of need of training to enjoy leisure. — The problem of providing harmless forms of recreation for Americans is discussed at length by J. P. Garber in his *Current Educational Activities* for 1911. In the preface the editor, commenting on the vocational and recreational movements together, says:

> If one were to indicate a [contemporary] movement more radically different and yet more largely promising than another, it is the general movement that in one form or another endeavors to make the school an opportunity not only to study but also to work and to play. . . . The vocational propaganda has achieved substantial recognition. The recreational activity, deep fraught with moral purpose, is steadily sweeping forward. It is just as essential to a stable social order that the individual should know how to spend his recreational hours as it is [that he should know how] to spend his vocational hours.

In commenting on the failure to provide amusements, particularly for adolescent boys and girls, the author quotes from Jane Addams, of Hull House, Chicago, as saying:

> We have no sense of responsibility in regard to the pleasures of young people, and continually forget that amusement is stronger than vice and that it alone can stifle the lust for it. We see all about us much vice which is merely a love for pleasure "gone wrong" — the illicit expression of what might have been not only normal and recreative pleasure but an instrument in the advance of higher social morality. (**1**: 39)

Among the recent endeavors to provide legitimate recreational opportunities Garber discusses the establishment of playgrounds, the use of schools as recreation centers, supervised dances in schools and other public places of recreation, theaters, Sunday amusements, athletic contests, and dramatic activities. He considers these from the standpoint of rural needs as well as from that of urban needs.

Phases of high-school activity involved. — In the case of high-school pupils the most important subjects which aim to train for enjoyment are literature (including the study of the drama) and music. Less important, but finding recognition in many high schools, are social training through clubs or societies and through school or class parties with dancing, and training which provides opportunities for all students to participate in athletic contests. We shall take these up for consideration in the reverse order from that in which they are mentioned in this paragraph.

Participation in sports and games. *Chances for all.* — The organization in high schools of training for enjoying participation in sports and games is important both from the standpoint of the present life of high-school students and from the standpoint of future adult habits. In most large high schools the common practice is to require formal gymnastics of all students, while a few students with special physical qualifications or special interests in contests become members of the various athletic teams. Usually this situation does not develop in many students the habit of enjoying the participation in such activities. In a few exceptional high schools the principle is adopted that the development of a few expert teams for interschool contests is relatively unimportant as compared with the organization of opportunities for nearly all students to be participants in sports or games, just as most students would be given similar training in the enjoyment of literature or music. In order to achieve this result the extreme emphasis on formal gymnastics disappears, and much attention is given to games and gymnastic and folk dancing. These statements apply to the activities for girls as well as for boys. By this means supervised recreation is provided, which not only brings into the lives of the students at the present time harmless and healthful enjoyment, but lays the basis for the continuation of such activities after graduation. As the importance of public recreation becomes better appreciated, more and more opportunities for adult recreation of this type will be provided. Even at the present time Y.M.C.A. buildings, social settlements, public playgrounds, and public parks with tennis courts and golf courses offer inexpensive opportunities for many persons.

Teacher must secure spirit of enjoyment. — In the organization of athletic instruction of the type described, the personality and point of view of the instructor is all-important. It is absolutely essential that he have the recreational point of view and that he endeavor to secure the spirit of enjoyment of active participation. Unfortunately many gymnasium and athletic instructors take the most formal point of view and drive students through drills as if they were a crowd of conscripted soldiers or convicts. The natural result is that students dislike the work instead of enjoying it as play or recreation.

Social activities. *Departmental clubs interest many.* — The organization of the social life of high-school students for purposes of enjoyment is a problem to which high-school administrators are giving much attention, and one toward which the energies of instructors who have capacity for such organization might well be directed. The trouble caused by the development of fraternities demonstrates the difficulties that are encountered when no general official provision is made for the social instincts and interests of students and these are allowed to find their own means of expression. Under expert guidance or suggestion many semidepartmental clubs or societies can be established, in which students with specialized interests will find the informal sort of association with their fellows that they desire and enjoy. These organizations may include literary and debating societies, dramatic and musical clubs, engineering societies, etc. Instructors who have the right temperament and capacity for assisting students in the maintenance of such organizations by helpful, friendly suggestion, without the appearance of domineering control, should be made responsible for coöperating with groups of students to secure the desired organizations. It is surprising how many students, often of the conscientious type, go through school absolutely lonely as far as intimate friendly association with their fellows is concerned. An hour a week devoted by an instructor to the interests of a small social group may bring enormous returns in the form of present enjoyment and future habits of enjoyment, since this method of securing recreation plays a considerable part in the lives of adult men and women and may play a larger part if the school provides appropriate training.

Supervised dancing directs natural impulses into harmless channels. — One of the most attractive and popular forms of enjoyment for adolescents and adults up to a certain age is dancing. Nearly everyone who has learned to dance enjoys it. On the other hand, many persons dislike receptions, and many do not enjoy parties without dancing. To the school, dancing presents the same problem that fraternities present. If properly supervised opportunities for dancing are not provided, many of the students will seek opportunities under conditions that are much less desirable and that are often positively harmful. Experience in a number of situations indicates that the school that provides opportunities in this line secures much better results than does one that either disregards or taboos dancing. From the standpoint of future habits of enjoyment the school has the opportunity to introduce many students to a form of enjoyment that is based on some of the most fundamental characteristics of human nature, and the opportunity to develop in all students habits of refinement and good taste that will offset somewhat the appeal of vulgarizing tendencies that are occasionally associated with dancing.

Supervisor must have correct standards and temperament. — In the organization of dancing as a part of the recreation of high-school students the instructors who would be most concerned are those of the department of physical education and members of other departments who have the personal qualifications for dealing with such matters. Here, as in all our discussion of training for enjoyment, the individual differences between teachers are most fundamental. Just as certain instructors, though excellent in ordinary teaching, fail miserably in organizing student clubs, so in the organization of dancing for recreation, the wrong temperament on the part of the teacher may result in failure both from the standpoint of enjoyment and from the standpoint of morals.

In the High School of The University of Chicago the organization of the school parties is described in the following quotation from the catalogue:

> *Parties.* — Every Friday during the autumn and winter, at the close of the afternoon session, an informal dance, open to all members of the school, is conducted under school supervision. These weekly parties have been given for eight years and have proved to be most helpful in the school life. Since all receive during the regular gymnastic classes the necessary instruction in dancing, they come to the parties able to participate on even terms. It is the custom of the boys and girls to come individually. No cards or programs are permitted. In form, the dance is a modified cotillion. Pupils must be prompt in coming and must remain throughout the hour. It has come to be the accepted rule of the afternoon that no pupil may refuse to dance with another. Public courtesy and school comradeship characterize these very simple but important social gatherings.

Music. *Two possibilities: participation and listening.* — Training for the enjoyment of music is rapidly being introduced into most large high schools. The opportunities provided may be divided into two types: namely, (1) training through participation in musical performances, and (2) training through listening to music. Both types of enjoyment play a prominent part in adult life; therefore training for each should be provided. Enjoyment through listening to music plays a much larger part in American social life than does enjoyment through participation. The possibilities of providing opportunities for enjoyment through participation have not been taken advantage of as extensively in America as in some European countries, notably Germany.

Premature formal technical methods kill enjoyment. — Here, as in the other phases of enjoyment which we have discussed, the point of view, attitude, and method of the instructor is of first importance if present enjoyment or future habits of enjoyment are to be secured. Too commonly the music periods are regarded by many students as a mild form of punishment. A teacher who visited the instruction in one high school at the beginning of the year said that the freshman sang with some spontaneity and interest, but that the other classes had had all of these characteristics killed off by the highly formalized, technical methods which the instructor used.

Simple, primitive forms of enjoyment first: unison singing. — Obviously, if students are expected to enjoy singing, it is important that the teacher begin with songs adapted to the stage of development that they have reached, and that abundant opportunity should be given for the enjoyment of relatively simple melodies and harmonies before advanced, intricate compositions are attacked or much formal technical practice attempted. In this connection Farnsworth says:

> If the full æsthetic value of chorus singing is to be attained, it is of the utmost importance that the music selected should be the gems of the art, and these should be memorized and so learned that they can be enjoyed after the student has left school. Unfortunately the desire to perform ambitious works, such as oratorio choruses, not only strains the voices by the extremes of pitch and power that such works generally demand, but after the student has

left the school he is able to reproduce his pleasure only as he becomes a member of a chorus where such works are given.

If, on the other hand, more attention is paid to unison songs, where associations can be made between the text and the melody, the student will have within his own power of reproduction beautiful works, thus adding to his racial inheritance in song the rich association of a joyous youth. (**7**: 323–324)

Remarkable results achieved in Richmond, Indiana. — The possibilities of developing habits of enjoying music in good company and to a considerable extent by continued participation after leaving school are well illustrated in the town of Richmond, Indiana, which has a population of about 25,000. Here, owing to the able instruction and guidance of one of the most competent directors of public-school music in the country, the high school with its large auditorium became the musical center of the town.

It is the meeting place of four musical bodies: (1) the People's Symphony Orchestra, which meets in this auditorium for four hours' rehearsal and public concert every Sunday afternoon from October until May; (2) the People's Chorus, consisting of some two hundred and fifty voices, which meets regularly one evening per week through the year; (3) the High-School Chorus; (4) the High-School Orchestra, which furnishes the music for the school assembly meetings and for other school gatherings. (**5**: 121)

The first two of these organizations are recruited to a considerable extent from the graduates of the third and fourth. Thus the school has made it possible for a community to develop a means of providing itself with opportunities for the enjoyment of music "that will offset the attractions of the saloon, the beer garden, the dance hall, the low-class music halls (so called), and other debasing social agencies, all of which use music of some sort as one of the chief sources of attraction." For a more complete account of the Richmond experiment see the article by J. F. Bobbitt in the *Elementary School Teacher* for November, 1911.

Training of choice and taste through listening. — The discussion of musical training up to this point has been concerned largely with training through participation in musical performances. In recent years, owing to the rapid development of mechanical players (various modifications of the phonograph and mechanical piano players), courses have developed in high schools and colleges which train for the enjoyment of music through listening instead of singing or playing. In commenting on these one authority says:

> If we are to develop a truly musical nation, the child must have a wider musical experience than he can ever cover in his own singing. He must have good music and much good music presented to him through the medium of hearing. Exquisite enjoyment may be experienced by contemplating a rose and inhaling its fragrance without the slightest knowledge of its structure from the botanist's point of view [or of its color or odor from the point of view of the painter and psychologist]. In like manner the more attractive pieces by the great composers can, if judiciously presented, give great pleasure without the slightest knowledge of their structure from the theorist's point of view. (**8**: 1011)

Learn to recognize, whistle, and hum themes. — In discussing the administration of such "acquaintance" courses in high schools Farnsworth says:

> No adequate standards of this kind of work have been established as yet. Some dwell on the historic and human connections of what is being heard; others go into the analysis of the form; but perhaps the most valuable for the general public and at the same time the simplest to manage so that a genuine æsthetic value shall result is to have the students hear the works a sufficient number of times so that they will be able to whistle or hum the important themes.

Importance of knowing musical motives. — As music is an organic creation, generally based on a few striking motives, to learn these motives so thoroughly that they can be readily recognized and associated with the works to which they belong would give the result to the student in a nutshell and would guarantee the most intelligent enjoyment when these works were heard from great orchestras and choruses. Not that some attention, both as to human interest, form, and structure, should not accompany such work; but the pupil should be able, when asked if he knows the G-minor Fugue of Bach, to have naturally spring into his mind the rollicking theme, rather than the fact that the fugue has subject and counter-subject, stretto, and pedal point. (**7**: 326–327)

Meaning of *enjoyment* is clear; of *appreciation*, vague. — In the discussion of forming habits of enjoyment or recreation up to this point we have considered participation in sports and athletic games, social training through clubs and dancing, and, finally, the enjoyment of music. In all of these we have been able to discuss our subject by confining ourselves to the use of the term *enjoyment* and have purposely avoided the use of the term *appreciation*. This has been done because the term *enjoyment* is relatively clear in its connotation, while the term *appreciation* is one of the most undefined and loosely used words to be found in pedagogical discussions. When a person says he *enjoys* listening to the sextet from the opera "Lucia," you have a fairly clear idea of what he means, but if he says he *appreciates* the same selection, his statement may have any one of the four following meanings: (1) that he *enjoys* listening to it; (2) that he *understands* its relation to the rest of the opera, or the fine points in its orchestration, or some other aspect of it; (3) that he both enjoys and understands it; (4) that he understands it but does not enjoy it. All of these meanings are self-evident, except perhaps the fourth, of which the following incident is an example.

One of the best-known professional pianists gave a performance in Chicago in which his aim in rendering certain selections seemed to be to show that he had so mastered the technique of fingering that he could raise his hands to great heights and bring them down with enormous force and hit the right keys. The result was such jangling sounds from the grand piano that one could hardly believe they came from the instrument, but suspected that the stage hands were dropping scrap iron behind the scenes. The next day one of the best musical critics wrote an account of the performance, setting forth what seemed to be the performer's purpose, and stating that in the critic's opinion the interpretation was in many places incorrect, that it was entirely lacking in harmony or beauty, and that he found it very unenjoyable. Certainly one could not say that this expert critic failed to understand the performance (or to appreciate it, as far as an understanding of musical technique is what is meant by appreciation), but clearly he did not enjoy it.

In view of these facts it seems desirable to use the terms *enjoyment* and *understanding* as an aid to clearness in our thinking, and to avoid the term *appreciation*.

Understanding need not improve or intensify enjoyment. —This chapter is concerned primarily with enjoyment. It is concerned with understanding only to the extent that the latter contributes to enjoyment. It is obvious that much enjoyment is possible with relatively little understanding. Increased understanding may bring enjoyment of new features or aspects, but the new enjoyment need not be any better or any keener than the enjoyment with little understanding. For example, contrast the enjoyment of a football game by two spectators. The first knows nothing of the fine points of the game, but can follow roughly the general trend of events and feels enthusiastically happy when his team is winning. The second spectator sizes up each play from the standpoint of the technique involved. If the team works smoothly and plays are handled well, he is pleased; if poor judgment is shown or an unskilled performance given, he is disgusted. Evidently his enjoyment is no keener or better than that of the first spectator, who is loyally and wildly happy over the success of his home team.

Confusing understanding and enjoyment common in teaching literature. — In such simple cases as this the relation between enjoying and understanding gives us little trouble in our pedagogical considerations. In the ordinary discussions by musicians concerning musical training, however, there is widespread confusion ; hence, in our brief summary of some of the problems of training for the enjoyment of music we simply quoted the statements of some of the authorities to the effect that considerable cultivated enjoyment is possible with relatively little understanding of theory or technique. In the next two sources of enjoyment which we shall consider, namely, literature and the drama, the question of the nature, possibilities, and value of the various forms of enjoyment in each case becomes so vital that we shall enter into a somewhat abstract psychological analysis and description in order to help us keep our bearings in the pedagogical considerations that are to follow. Inasmuch as there is very little reliable discussion in this field, I shall quote, with the author's permission, an entire five-page article published by E. L. Thorndike in the *Teachers College Record* in 1901. The paragraph headlines are not in the original article, and in a number of places I have substituted the word *enjoyment* in brackets for the word *appreciation*.

THE ÆSTHETIC EMOTIONS

Need a psychological analysis of æsthetic emotions and their effects. — If we are to know what we are about when we are teaching English literature to boys and girls, we must get some rational account of what the æsthetic emotions are and what they do to us. Knowledge abdicates and opinion reigns if we ask just what the so-called æsthetic effects are and what difference they make in one's general character. This is a psychological question, to be settled by psychological methods, and it is a shame that, at least since Aristotle, the best work and the bulk of the work should have been done by literary men who had the data but not the means of handling them or of understanding their significance. The equipment fit to solve the question is that of a gifted person acquainted with psychology and possessed of psychological insight, who has studied extensively the effects of literature on people, particularly on children, for the nature and functions of the æsthetic emotions will be clear only in the light of their origin and development. No such person has appeared with the answer, and we must be content with clearing a passage for him in so far as present data allow.

This is no occasion for a treatise on the æsthetic emotions from the standpoint of genetic psychology, and no such treatise will be attempted. Let us simply try to see clearly what facts we can state, as a supplement to the existing material on æsthetic and literary criticism, which may assist the intelligent teacher to an insight into what happens when students are led to read literature ostensibly for æsthetic enjoyment — for fun.

Three types of enjoyment: of technique, sensory pleasures, suggestiveness. — First of all, with any given piece of literature, all sorts of different things happen in different people. Not only do many of them fail to get the æsthetic pleasure intended, but in those who do, it takes many forms. Of those who do not, some feel in its place bona fide feelings, actual attitudes toward the real world, real, not æsthetic, emotions. These may be to them desirable or the reverse. Of those who do [get æsthetic pleasure], some feel an enjoyment of the technical skill with which the writer has secured his effect; they enjoy the poem as the football expert enjoys watching a game, not caring which side advances, unmoved by the zeal of combat, influenced only by the skill of the plays, the adroitness of the generalship, the technical beauty of the way things are done. Some feel the sensory delights of rhythm or melody; they enjoy the poem as the artist might enjoy the proportions of the football player, the grace and ease of his movements (rare enough in a football player). The majority enjoy what is poorly called, for lack of a better word, the *suggestiveness* of the poem, the mood it arouses, the feelings of joy or sadness or pity or faith, that are not real joy or sadness but somehow are sweet. "It means so much; it made me feel the thing," they say. These are like the spectators who enjoy a football game because men may, and do, get hurt — because they feel, yet without results to their own profit or loss, the ambition for victory, the pluck and catastrophe and recovery. There are, of course, all sorts of combinations of these three types.

Mental responses to literature: ideas, real emotions, enjoyment of workmanship, sensory pleasures, pseudo-emotions. — It is obvious that what we would at first blush call æsthetic appreciation turns out to be now one thing, now another, now a complex. Indeed, many people, failing to experience any of these three mental conditions, take definite ideas or ordinary emotional feelings to be the æsthetic emotions of which they read. Many a one there is who reads his Browning in dead earnest as a sort of philosophy, — commentary on human nature and moral guide, — happy to get great ideas and feel new hatred of this and love of that, and thinks that he gets all there is in the poetry for anyone, and wonders how intelligent people can endure Keats. From this ambiguity of the words *æsthetic appreciation* and *æsthetic emotions* has arisen much confusion. Let us therefore use the terms *ideas*, *real emotions*, *enjoyment of workmanship*, *sensory pleasures*, and *pseudo-emotions* to cover the main facts of the mental conditions aroused by literature. Of these terms we may further define *real* and *pseudo-emotions*. Let us mean by *real emotions* such feelings as lead us to acts appropriate to the situation if real. The countryman at the theater who wants to climb on the stage and knock down the villain in the play offers an example. Let us mean by *pseudo-emotions* such feelings as do not [lead us to acts appropriate to the situation if real]. If we enjoy reading or seeing the last act of "Othello," it is because our emotions are not such as to lead us to shriek with horror or turn away our eyes from the awful sight. We may now secure some profit from the analysis and natural history of these various effects.

Ideas. — The ordinary laws of human nature account for the nature of the ideas aroused by works of art, and we have seen that in practice the service of literature in presenting ideas and arousing ideals has been recognized.

Real emotions. — The production of real emotions is of two sorts. The poem or story may arouse the emotion which the facts or events portrayed would if real, or it may arouse some different emotion. The example [of the countryman at the theater] already given is of the first sort. The arousal of a high flood of joyous excitement by the description of a double duel in the dark is of the second sort. The practical problem of when and where it is desirable to use literature to induce real emotions is not hard. We may merely repeat Professor James's warning against exciting them without providing some useful outlet in conduct. . . . We may also suggest that the rational man will regulate his emotional attitude toward the real world by the facts of that world itself rather than by second-hand and often distorted pictures of them, and that there is some danger in forever wheedling people into being wise or good or happy. However, as things go, most of us probably will have to be wheedled.

Enjoyment of workmanship. — The enjoyment of workmanship is so rare among young students that nothing need here be said of it.

Sensory pleasures. — The sensory pleasures are a far less important part of [enjoyment] in the case of literature than in the case of music, painting, or sculpture. Either because we are born with organizations which like certain combinations of sounds, lengths, stresses, and pauses, or because these combinations have gone with other desirable things, we come to like certain rhythms etc. The explanation of those due to our organization will undoubtedly turn out a purely physiological one. The explanation of the second sort is a matter of association.

The sensory pleasures appear early in the child's love of rhythm and are molded by precepts to some extent, still more by example. The æsthetic education of children in the purely sensory [enjoyment] of literature can thus begin early.

Pseudo-emotions. — What, now, of the chief problem in the æsthetics of literature — the nature of these pseudo-emotions? What is the æsthetic pity that is not real pity, the sympathy with the hero which does not produce real pain or real tendencies to help him? They are not the real emotions in weaker intensity. On the contrary, they may be stronger. They are qualitatively different. This difference is not, as has been suggested by some writers, the absence of a personal element; we do not feel real emotions with a personal warmth and intimacy, and æsthetic, or, to use our word, pseudo-emotions, with the calm of an indifferent spectator.

The qualitative difference . . . that one finds by observing himself and questioning other people [is] that the painful quality of many real emotions is absent from their pseudo-equivalents — [for example], we like to feel pseudo-sorrow. The pseudo-emotions are less permanent and therefore more easily modifiable. The tendency to fatigue and prostration, which is the result of real emotions, is largely absent in the case of the pseudo-emotions. A man tired from the excitement of a fit of rage might go to see "Othello" to get rested.

Enjoyment as contemplative play. — If we now become genetic psychologists for a moment, we may find the key to the real nature and function of these emotions; for they evidently grow out of the imaginative play of children. Children systematically and habitually turn the objects and events of the natural world into means for keeping their mental life going. They themselves play the rôles and make their own actions help to arouse the feelings they so enjoy. They learn readily, and in easily ascertainable ways, to so manipulate their environment as to get such feelings out of it as do not bring painful consequences or the need of hateful inhibition and effort. A witness to the connection between the later pseudo-emotions due to literature and the earlier pseudo-emotions due to play is found in the frequent tendency of young readers to put themselves in the place of some one of the personages in a story. The boy makes the hero's words his words, the hero's acts his acts, and lets the rest of the book be a stage for his adventures, and thus assimilates the new form of mental play to the old form in which he himself did actually run and fight and conquer. Were I to rename the process of enjoying literature, I should call it contemplative play. Were I asked to tell the date of appearance of the æsthetic, or pseudo-emotions, I should answer that when the baby begins to act for the sake of gaining feelings other than those connected with such purely physical matters as food, warmth, exercise, and protection, then and there he starts on the æsthetic highway. When he begins to use words as a means of gaining such feelings, his career as an [enjoyer] of literature has begun, and from then on a continuous development may be traced.

Pseudo-emotions from literature lack real pain and effort. — Children like to feel, we said in another connection, just as they like to move. To have things going on in their minds is *per se* desirable. The desirability increases in proportion as they can exclude the particular elements of feeling which cause discomfort. Chief of these are certain sensations and emotions which nature provides as warning signs against dangerous conditions and the feeling of effort or inhibition which is present when we keep some thought or feeling down. In their play, I said a moment ago, children so manipulate their environment as to get such feelings out of it as do not bring painful consequences or the need of hateful inhibition and effort. The feelings brought by play, then, differ from those of serious life by virtue of what they are not — by virtue of the pain and effort they do not arouse. Here we have our fundamental distinction between the pseudo and the real emotions. The former differ from the latter by virtue of what they are not, by being responses to stimuli which the wisdom of long literary effort has devised to arouse feelings minus certain undesirable elements. Just as the child finds the acts and ideas that excite without frightening or stimulate without effort, so the tribe of writers have found means of presentation which filter off the joy of conflict from its tremors, the sweet of sympathy from the bitter, the thrills of ambition from its strife and worry, the zest of interest from its strain and effort.

Function of pseudo-emotions to give innocent pleasure. — From the nature and genesis of these pseudo-emotions we may now hope to learn their function. Except by special dispensation they do not serve to purify the mind of their real parallels. There is no reason why they should and no evidence that they do. Nor do they serve to predispose the mind to their real parallels. It does not make children feel real lonesomeness to read "Robinson Crusoe," nor real bloodthirstiness to read "The Last of the Mohicans." We know well enough how the quietest people can revel in the pages of romance. When a child's emotional make-up is changed by the books he reads, it is the real emotions, or, more often still, the ideas aroused, that do the work. The function of the pseudo-emotions is simply to give innocent pleasure and to be symptoms that the mind is at least healthy enough to enjoy unimpeded action. With our pseudo-emotions from novels and dramas we play at love or war as our children play at keeping store or hunting bears.

> Play on, children of all ages, says the wise man. Only do not imagine that you are saving your souls or remodeling your minds by the game. Play on, you who are champions, professionals, who turn play to a trade and live by your skill at it, who write essays telling how you feel as you play so that others may emulate you. Play on, but do not despise the workers in this world. (**3** : 195–200)

In further discussion of some of the points made in the above quotation the following comments may assist us in clear thinking about training for enjoyment.

No necessary connection between good art and good morality. — The first point to notice is suggested by the last paragraph in the quotation, namely, that there is no necessary connection between good or high art and good moral behavior. History furnishes any number of examples in which periods of the highest development of artistic activity have been characterized by the greatest moral degradation. Among the best examples are certain periods in Greek history, and life in the Italian cities during the Renaissance. Comparing these, J. P. Mahaffy says:

> We can quite imagine that, had the mere masterpieces of Italian art and literature survived to us from the Middle Ages, — had we lost the endless chronicles and acts and letters which admit us to the secrets of the age and disclose, in all their nakedness, the burning passions and the dark vices of artists and kings and bishops, — we might have formed a very different and a very false idea of the brilliant Italian republics, which supply the only real analogy to the Greek states of classical days. We can imagine the admirers of their noble pictures and churches, of their splendid costumes and pageants, of their great patriotism and valor, of their refined chivalry, to have scouted any stray suspicions as to their darker features. The Madonnas and other saints would be taken as the ordinary type of their women; the apostles and martyrs, of their men; and they would be reported a people of such universal beauty that ugliness was quite an exception. The diffusion of their art through so many cities would prove that they were all trained in the fine

> arts and skillful judges of artistic excellence. Their piety would be a national feature; their poetic and chivalrous love would be national also — in fact, we might have a picture very like the ordinary notions about the Greeks, with the addition of some splendid features resulting from a higher and purer faith. And these would probably compensate for the undeniable inferiority of their art to that of the Greeks.
>
> Yet all this picture would be, as we know, historically false. The Italian republics were torn with wild and savage passions; their citizens were violent and lawless, grossly immoral in their lives, and reckless in their actions. Their despots were cruel and inhuman beyond all decent description, and the Christian faith which they professed had no more influence on their lives than the moral lessons of the old philosophers and poets upon the Greeks — nay, rather, the possibility of deathbed absolution may have acted as a release from all moral obligation during active life.
>
> Nevertheless, these peoples' art *was* splendid; their æsthetic sense was not dimmed by their crimes, and even the most abandoned of them have about them something truly and justly fascinating. And again, their pure and saintly men stand out in strange and splendid relief. We thus come to see how great intellectual and artistic excellence is compatible with great moral faults, with vice, and with meanness. We come to see that ideal conception and perfect execution imply lofty genius and patient diligence, but do not imply in the appreciative spectator either of these qualities, and in the artist no moral counterparts. But we may also learn how the artist, or the school and succession of artists, may always be the few, the exceptional, and the isolated among the crowd, and how their great works may vaguely educate the judgment of the masses without affecting their principles. (**2**: 485–486)

On the other hand, the Puritans who commonly looked upon all æsthetic enjoyment as reprehensible, were most austere in their morality. Hence, as Thorndike suggests, there is no necessary connection between the contemplative play of the enjoyer of artistic productions and the desire and endeavor to work for the common good which we know as morality.

Moral or immoral themes may be effectively presented by artists. — Although the enjoyment of art may not be an effective moral agent in itself, the artistic presentation of moral ideas may be very effective. An artistic writer or actor is a master of a given form of expression. Obviously, if he chooses to express moral ideas, his appeal ought to be more impressive and suggestive than an appeal made by a person who is not a master of the form of expression used. On the other hand, the skilled writer or actor might choose to express immoral ideas, and in this case the appeal might possess just as strong a suggestive power. Naturally, in our efforts to convey moral suggestions in the school, we will try to secure effective artistic expressions of moral ideas and avoid effective artistic expressions of immoral suggestions.

Simple forms of æsthetic enjoyment as "good" as enjoying technique. — In view of the preceding discussion it is clear that the more primitive forms of enjoyment of rhythm, rime, melody, color, story, action, and humor are just as good or respectable as the enjoyment of workmanship, technique, or expertness such as are involved in a contemplation or study of structure, composition, meter, choice of words, figures of speech, technical analysis. Thorndike dismisses the discussions of these forms of enjoyment with the single statement that "the enjoyment of workmanship is so rare among young students that nothing need here be said of it." Yet, this enjoyment of workmanship is often the most emphasized element in courses in the study of literature, drama, and music. It is doubtful whether many adults, even those who are well educated, develop much of it. This is well illustrated by the vigorous applause at classical concerts when there is hope for a melodious popular encore. The greater thunderous applause that follows the encore is usually clear indication that the applause for the main selection was inspired by hope of what was to come. Just as clearly defined rhythm, simple melody and harmony, and beauty of tone constitute the chief factors in the musical enjoyment of most persons, so rhythm, rime, and a "good story" constitute the basis of most enjoyment of poetry, a "good story" and humor, of the enjoyment of prose, and action and humor, of the enjoyment of the drama. As far as all moral consequences are concerned, it is just as good to enjoy Sousa's band as to enjoy a symphony orchestra or a Wagnerian opera; it is just as good to enjoy a farce-comedy that contains no vulgar suggestions as it is to enjoy a Shakespearean tragedy; it is just as good to enjoy Jack London's "Burning Daylight" or most of the stories in the *Saturday Evening Post* as it is to enjoy Thackeray or the *Atlantic Monthly*.

Study of literature. *Introduced in high school from classical standpoint.* — The preceding paragraphs presented the fundamental point of view upon which the discussion of the development of habits of enjoying literature will be based. A brief historical comment will further assist us in getting a proper background for the discussion, since the study of English literature is a relatively recent development in high schools. One of the best means of securing an understanding of this fact is to read the paper entitled "What is a Liberal Education?" published by President C. W. Eliot, of Harvard University, in the *Century Magazine*, in June, 1884. (See also his "Educational Reform," 1898, pp. 97–101.) In this essay he points out that many high schools gave *no* training at that time in reading English literature, and the rest gave *little* attention to it. He argued that it should be taught as a serious object of study and as constituting one of the most important subjects in a liberal education.

As a result of such views as this the New England Commission on College-Entrance Requirements originated in 1888 the idea of a prescribed list of books to be read in high schools. The idea was adopted by other organizations — for example, by the Committee of Ten of the National Education Association in 1892. The practices that developed under this system in the teaching of high-school literature are still in vogue in many places and are familiar to all who have attended high schools since 1895. The practice has consisted of an intensive analytical study of a few books in class, with additional reading of other books outside. The books selected consisted of classics which were chosen because of their superior literary qualities or their importance in the history of English literature.

English teachers rapidly adapting methods to social needs. — We have already described at some length the rapid development in recent years of the general tendency to consider high-school education in terms of the needs, interests, and capacities of high-school students and in terms of rather direct training for participation in the various types of social activities found in the communities which the high schools serve (see pp. 60 and 78). This general movement is affecting the teaching of English as it is the teaching of all other subjects. The best expression of this influence is found in the activities of the National Council of English Teachers and its official organ of publication, *The English Journal*, the first volume of which was issued during 1912. For an outline of the history of this movement, with a select bibliography, see pages 95–121 of the first volume of the *Journal*. So active is the progress of this reform movement in the teaching of English, and so radical are its measures, that many of the plans and discussions which were prepared during the period of the dominance of college-entrance requirements are of little use at the present time. Hence, in presenting this phase of the subject I shall quote at length from descriptions of actual experiments in teaching literature that have been undertaken in recent years. The first point to be considered is training in the reading of fiction.

Training to read harmless fiction is of first importance. — With the exception of the reading of the daily newspaper by adults, the reading of contemporary fiction will probably constitute the largest part of the reading done for recreation by most children and adults. This being the case, it is obvious that training which aims to establish correct habits in selecting and reading current fiction constitutes one of the most important duties of the school.

One of the most important services the high school can perform is to *introduce students to the writers of the best current fiction who will continue to be producers of such literature for five or ten years after the students in question have graduated from high school.* If students are thus started to read worthy books by active contemporary authors while in school, they will be given a basis for selecting, from the overwhelming mass of new fiction which is being printed, those works which are admitted by many competent judges to be as good as any English fiction which was written in the past. Progressive teachers of English are interested in preparing reading lists which include such contemporary fiction to serve as guides to high-school students. One of the best-known lists is that prepared by a committee of the National Council of English Teachers, which can be purchased for ten cents from the secretary of the Council. (See **16** *a*.)

The problems involved in teaching fiction have been well discussed in an article entitled "The School and Current Fiction" (**13**). The author faces squarely the real issue presented by the fact that one hundred thirty-seven out of some two hundred boys in his high-school classes were regular readers of the *Saturday Evening Post* (which, by the way, he says contains much good literature) and that the *Ladies' Home Journal* and the *Cosmopolitan* ranked next in the list of magazines read. He mentions the further fact that many students do practically no reading for enjoyment. In summarizing his discussion of methods of dealing with this situation in such a way as to lead students to read good fiction and to forsake what he calls rubbish, he says:

> In order to enable our pupils to get the most out of current fiction, we must do several things. First, we must make the fiction

that we teach in school so interesting that they will want more. That means that we must like it and *let them see that we do.* Secondly, we must read a good deal of the sort of current fiction that we expect them to read, and even a certain part of what we want them not to read. Thirdly, we must keep before them a list of books that will be good for them. And we must not patronizingly recommend these from above. We must say, "This is a good book; I have enjoyed it, and I want you to enjoy it too." And we must let some of the boys [and girls] tell the class about the books they have read, encouraging them to speak with absolute sincerity. We must work at the level of those we teach. One cannot do slumming by telephone.

We aim to teach our students to share our pleasures. We must, then, begin by sharing with them those in which our pupils are fitted to share. We must show them what we get out of books. We must help them to find the best books. It is no use forbidding the half good. We must praise it and lead on from it, up to the wholly good, to the real uplands of literature. These, some of us feel, rise far higher than the highest fiction. Be that as it may, we must see that our pupils get the good that fiction has to offer them. For in this, I repeat, lies the justification of teaching fiction. We are not teaching them to write novels. We are not teaching them to criticize novels. We are not even qualifying them to talk about novels. We are not preparing them to be examined. We are trying to show them how to get a wholesome pleasure out of good stories. We are trying to teach them to see through the eyes of great novelists that the world is interesting to watch, that it is good to live in, and we are trying — this is our topmost endeavor — to teach them to feel, as the greatest of novelists have felt, that human nature is a noble thing, that through all the confused pattern of life there runs a meaning and a mystery. No student whose novel reading leads him to this has wasted his time. (**13**: 23)

Training to read magazines especially important. — Another innovation in the recent reform wave for developing harmless habits of enjoyment of reading is the organization of systematic courses in the study of American literature, with special provision for training in the reading of the better grades of magazines. The following quotation presents part of the justification for such training in reading periodical literature:

> Such a study can be made a profitable adjunct to the course in American literature. Conditions in the literary life of America certainly justify it, for, as Professor Barrett Wendell says, "the illustrated monthly magazines which circulate by hundreds of thousands, and go from one end of the country to the other, provide the ordinary American citizen of to-day with his nearest approach to literature." The modern magazine does indeed dominate the literary life of the average American to-day. He has time for a casual glance at the daily news and the morning editorial at his breakfast or on his way to business; ten or fifteen minutes can be spared now and then in the evening or on Sunday or a holiday for a short story or a striking article in some monthly or weekly; but he has neither time nor inclination for much continuous reading of longer tales or elaborated treatises. Besides, the coöperation of the economic idea of division of labor with the educational ideal of specialization has made it possible for the magazine to furnish an intellectual diet suited to all tastes. Moreover, our greatest writers of short stories and poems are those whose work has appeared or is still appearing in our magazines. Indeed, the history of the American magazine is the history of American literature. . . . As Henry Mills Alden, for forty years editor of *Harper's Magazine*, says: "The catholicity of magazines and their hospitality to young writers have done more than all other influences to build up our literature." Many of the masterpieces of American literature first found a reading public through the magazine. Bryant's "Thanatopsis" and "To a Waterfowl" appeared in the *North American Review*; Halleck's "Marco Bozzaris" and Bryant's "Death of the Flowers" were published in the *New York Review*; Poe's "Raven" was first published in the *New York Mirror*; Longfellow's "Psalm of Life" came out in the *Knickerbocker Magazine*; Holmes's first two installments of the "Autocrat of the Breakfast Table" were published in the *New England Magazine*, the later ones in the *Atlantic Monthly*; Whitman's first literary success, "Death in a School Room," came out in the *Democratic Review*; Lowell's first series of Biglow Papers was published in the *Boston Courier*; Edward Everett Hale's

"The Man without a Country," in the *Atlantic Monthly*; and Howells's "Venetian Life," in the *Boston Advertiser*; and these are but a few instances. (**20**: 357–361)

For the method of conducting the class work and arranging assignments in a course based on the reading of contemporary magazines, the student should read the whole article from which the above quotation is taken.

Short, serious articles on current events read for recreation. — In connection with the reading of magazines for purposes of enjoyment it is not necessary to confine one's self exclusively to fiction. Many high-school students are interested in topics of the day and would do more or less reading concerning them if properly stimulated and encouraged. By proceeding from the news items and cartoons in the daily papers to news summaries and cartoons in the weekly reviews, and from these to editorials in the newspapers and articles of similar type in the weekly reviews or in the magazines, it would be possible to initiate habits of reading such material. As with adults, the initial interest is always aroused by the fact that something of general human interest is taking place. Hence the simple narrative of such an event is usually of quite general interest, and by skillful teaching the interest can be carried over to the more thoughtful discussions of current events. Certainly many adults find their daily or weekly recreation in the reading of such material, and many of the questions and events of the day possess interest and educational possibilities for adolescents.

If classics are taught, correct methods should be used. — After we have considered current books of fiction and current newspapers, reviews, and magazines, with their installments of fiction and their discussions of the vital and serious problems of daily life, we have covered practically all the forms of reading for recreation which will play any considerable part in the lives of the adults that most high-school boys and girls will become. If teachers of English are themselves acquainted with the good and the bad in current books and magazines, and are skilled teachers, they will find it easier to develop habits of good taste and refined enjoyment in reading by using material from contemporary social life than by using material from past social situations which are relatively remote from the interests of young persons of to-day. If, however, it is considered desirable to study classics which reflect former social situations or which may be considered good stories for all time, certain special points in method should be kept in mind.

Teacher must know what is adapted to students. — The first point to be considered is the adaptation of the material to the interests of the students. The importance of the teacher's judgment in this connection is emphasized in the following statement by Professor F. T. Baker:

> In the teaching of literature we are to assume [in the teacher], as I have already said, a good general knowledge of real literature, sound taste, and openness of mind.
>
> But knowing literature in this way is not enough. One must come to know what it may mean, or may be made to mean, to the boy and girl — what things in a given poem or story or drama may have interest and significance to an immature mind. He must know, in other words, the points of contact between the literature and adolescent minds. If the main interest of the selection, as he sees it, is beyond the reach of boys and girls, he had better pass the selection by. Some girls will get the quaint humor and the gentle pathos of "Cranford"; most boys will not. The self-questioning of George Eliot's heroines is too analytic and too excessively moral for boys and girls. George Eliot, except for "Silas Marner," belongs to the college age. The conceits of the Elizabethan and Cavalier lyrics presuppose a background of general reading and special interests which, for most people, postpones them indefinitely. (**12**: 340)

Satire on analytical methods with classics. — The second point to notice, if teachers expect to continue to teach literary classics, is that the method should emphasize the obvious effects which the author intended to secure in his writing, and should not involve a detailed analytical study of his devices for securing these effects, or other matters of technique. An excellent satire on the current analytical and technical methods of studying literary classics is the following quotation from an address by Professor F. N. Scott. In it he describes an imaginary experiment in teaching English literature to a sophomore class in a high school in which the college-entrance requirements in English literature had been abolished and the teachers left free to choose any books to be read by the students. He proceeds as follows:

> If I were not engaged in this inferior business of teaching in a university, and my time were not all taken up with it, I should like to go into a high school where these formal prescriptions had been put aside and take charge of a class in English. I think I should talk to the pupils in some such way as this:
>
> "The classes of former years have been reading this prescribed set of books — a pretty poor sort of literature, in my opinion, and not proper for young people to read. You are very fortunate in being able to get rid of them. They are mostly very dull and uninteresting. There is the Iliad, for example, full of fighting and blood and the killing of men, and of armies clashing with one another in desperate conflicts where all the elementary and violent human passions are set free. Horrible! The International Peace Society cannot approve of anything of that sort. We will put this book aside, and I hope none of you will touch it. Then there is the 'Faërie Queene,' all about giants and maidens in distress, magic and mystery of all sorts — perfectly useless, a futile, silly thing, nearly as bad as the Arabian Nights. Don't go near it. I trust, also, that no one will attempt to read 'As You Like It,' which has a wrestling match in the very beginning (these minor athletics ought not to be allowed in literature) and tells about a girl who ran off into the forest in boy's dress—a most improper performance on her part. I am sure we ought not to talk about those things in this class. And even worse, perhaps, is Tennyson's 'Princess,'

where a prince, who ought to know better, disguises himself in woman's clothing and gains admission to a girls' academy. A scandalous thing! No gentleman would act in that way. In short, these books are all harmful and ought to be destroyed. For the present I will put them on the top shelf of the closet here, and just as soon as the janitor is at liberty we will have them burned.

"And now we are going to take up some books which I know you will enjoy. I want you to be just as enthusiastic as you can about them, for we are going to study them and study them hard, and you will get a great deal of profit out of them, and all will be greatly improved. For the boys we will take Captain Mayne Reid's 'Afloat in a Forest.' We are going to read that book a paragraph at a time and examine carefully every allusion in it. It is about some people who floated down the river Amazon. First we will draw a map of South America, locating the course of the river, and then we will ascertain how wide the Amazon is at various points and how fast the current moves. Finally we will determine the amount of silt which is deposited by the river at its mouth. Captain Mayne Reid, by the way, makes a mistake. He has three people float down in a much shorter time than they possibly could. You will see that this is so when we discover the exact relationship between the flow of the stream and their rate of progress. We shall go into these details with the utmost care, and after a little while you will write some nice little essays about them.

"For the benefit of the girls we will read in the same careful and scholarly way Robert Chambers's 'Heart Throbs of a Multimillionaire.' We will determine just how many times the heart throbs when two hearts are in unison, and learn about the two kinds of blood corpuscles, and so on, and there will be essays on all these things also.

"But this is not all. Two years from now, when you are seniors, we will take these books up again and go over them and over them and over them until you know the answers to every last question in regard to all these mathematical, biological, chemical, and topographical things, and that will be absolutely delightful."

I think we can all prophesy what would be the result of such an experiment. If the room were not locked or the closet door locked, after two or three weeks those classics which were put on the top shelf would have to be rebound, and as regards the other books, when their very names were mentioned, I think the pupils would fly shrieking. They would never want to see the "Heart Throbs of a Multimillionaire" again, or even "Afloat in the Forest," good as that book is. (**19** : 70–72)

Two lines of reading: studying and enjoying. — Schools have dealt so exclusively with subjects in which intellectual processes, such as reflective thinking or acquiring information, are uppermost, that teachers are at a loss to know what methods to use when the responses to be secured are primarily emotional. Similarly, they are at a loss to know how to proceed to develop abiding interests, that is, habitual tendencies to reach out after more experiences along certain lines. Hence, in teaching literature they apply the methods that have been used in the study of mathematics, science, grammar, history, etc., with the result that they develop an abiding distaste for literature instead of an abiding interest in it. An excellent discussion of these mistakes in method is found in an article entitled "Two Lines of High-School Reading," which teachers of literature should read. (**21** : 476–482)

Difficult to avoid snap courses in reading for enjoyment. — Closely related to the difficulty that we have been discussing is the fear that a course intended to develop habits of enjoyment will become a snap. This means either that the students will not have to dig and grind to overcome difficulties or that they will not do the outside reading which is required. The first of these meanings need not concern us, since persons are not supposed to dig and grind to enjoy artistic productions. The second danger, namely, that students will not do the outside reading, is difficult to meet. As a first step, however, the list of readings can be made up of such interesting books that students will wish to read them. Secondly, the readings can be discussed in class in an informal way, so as to secure an indirect check upon the reading done by the students.

Spontaneous evaluations by students start discussions. — If the books to be read are within the range of the interests and understanding of the students, they will call forth a wealth of responses, comments, and evaluations from the students themselves. These can be made the starting point for class discussions which will bring out all the fundamental effects that the author expected readers to get. For the most part these discussions will *not* be concerned with an analysis of the tools or devices that the author has used to secure his effects. Such informal teaching requires a more skilled teacher than does teaching based upon an annotated edition of a classic accompanied by study questions. Hence, in high schools in which teachers are expected to teach literature who have no adequate preparation for it, the current formalized method will probably continue in use. Teachers who know their subject matter thoroughly, however, and know boys and girls as well, ought to succeed with the informal method recommended above.

Enjoyment of drama. *Prominent in social life.* — Up to this point in the chapter we have considered the following sources of enjoyment: (1) participation in sports and games, (2) social activities in the form of clubs, parties, and dances, (3) music, and (4) reading. The last source that we shall consider is the drama, which, in the cities, plays a very large part in the recreation of many persons and has always been an important factor in general recreation. Its influence in this connection was strikingly presented by Friedrich von Schiller (1759–1805), the great German poet, in an essay entitled "The Stage as a Moral Institution," published about 1795. After discussing the advantages of the drama from various points of view he says:

> Another advantage belongs to the stage — one which seems to have become acknowledged even by its censurers. Its influence on intellectual and moral culture, which we have till now been advocating, may be doubted, but its very enemies have admitted that

> it has gained the palm over all other means of amusement. It has been of much higher service here than people are often ready to allow.
>
> Human nature cannot bear to be always on the rack of business, and the charms of sense die out with their gratification. Man, oppressed by appetites, weary of long exertion, thirsts for refined pleasure or rushes into dissipations that hasten his fall and ruin and disturb social order. Bacchanal joys, gambling, follies of all sorts, . . . are unavoidable if the lawgiver provides nothing better. A man of public business, who has made noble sacrifices to the state, is apt to pay for them with melancholy, the scholar to become a pedant and the people brutish, without the stage. The stage is an institution combining amusement with instruction, rest with exertion, where no faculty of the mind is overstrained, no pleasure enjoyed at the cost of the whole. (**18** : 338)

Three opportunities: reading, participating in, and attending plays. — In providing training for the enjoyment of the drama there are three types of opportunity, namely, (1) training through the reading of plays, (2) training through participation in amateur dramatics, and (3) training through attendance at professional performances.

Expert oral reading of plays should replace silent reading. — The first of these forms of training, namely, reading plays, is the one most commonly emphasized in schools, but the one that possesses the least chances of success. Many teachers seem to overlook the fact that plays are written to be acted and seen, not to be read by the ordinary reader. It is very difficult for most persons to get the intended effects by reading a play. Even very well-trained persons often fail, as is shown by a recent review of a performance of Bernard Shaw's "Press Cuttings" in Chicago. The critic, one of the best known in Chicago, stated that the performance was a revelation to him, since he had not felt when reading the play the large amount of humor which the performance brought out. An oral presentation or reading of a play by a skilled reader who is familiar with the effects and values which should be brought out is superior to silent reading or study and offers possibilities in many centers of population where good performances are infrequent. Even a fairly talented and well-educated teacher, by careful study and preparation of a few plays, might develop a limited repertory, which could be used effectively with classes from year to year.

Skilled teachers provide educative dramatization by students. — The second form of training for the enjoyment of the drama, namely, participation in amateur dramatics, is emphasized in many schools where capable teachers are available. Under the tutelage of well-trained and intelligent leaders, simple, unpretentious plays may be attempted with students of all ages, and an interest in dramatic performances gradually built up that will result in habitual good taste in choosing plays to be attended outside of school. An example of an extended experiment in training children along these lines is described by Alice M. Herts in a book entitled "The Children's Educational Theatre," which teachers concerned in instruction in dramatics should read.

Attendance on modern plays should entertain if it is to instruct. — Training through attendance upon professional theatrical performances is impossible in many places, owing to lack of opportunity. Moreover, this training is difficult to organize in a systematic way even where there are such opportunities. Many skilled teachers, however, take advantage of whatever occasional opportunities are afforded and utilize them in connection with the instruction in literature.

In selecting a play to be attended the first point to consider is whether it is sure to be entertaining. This point is often forgotten by persons who are striving to achieve some educational purpose through the theater. In the statement by Schiller given above on page 263 he said the stage *combines* amusement with instruction, but many advocates of the uplift drama at the present time overlook the necessity of amusement altogether and simply provide instruction. As a consequence they fail to have audiences to instruct.

An example of a systematic high-school course in dramatic study which includes attendance upon modern plays is described in the *English Journal* for February, 1913. (**10**: 93–98.) While the experiment is somewhat classical in its tendencies, it may be regarded as a movement in the right direction. One of the aims of the course is stated to be "to approach Shakespeare and other classic playwrights through what is the most vital thing in the life of many young people to-day — the stage; and to guide the pupils' theater-going and form their taste in modern plays by comparison with those that have become classic."

Conclusion of discussion of forming habits of enjoyment.— This will conclude our discussion of the formation of habits of harmless enjoyment. We have tried to face squarely the issue presented by the fact that, as people secure leisure time, methods of enjoying this time in innocent and harmless ways must be provided by society, and the schools must develop habits of choosing the right forms of enjoyment. In order to avoid confusing the issue with training for intellectual efficiency, we have tried to make it clear that we are not here concerned with appreciation (whatever that may be) or understanding. In order to avoid confusing the issue with moral training, we have shown that many forms of enjoyment are almost *unmoral* in quality; that is, they bear little or no relation to one's desire and endeavor to work for the common good.

In solving the problem the educator must first study the forms of enjoyment which we find practiced by ordinary well-behaved, cultivated people. The list includes sports and games, clubs and parties, dancing, music, the reading of fiction, magazines, and newspapers (including serious articles concerning questions of the day), theater-going, and some other types, such as visits to art galleries, which we have not considered in this chapter.

In each case the pedagogical problem is to adapt the school activities in these lines to the capacities and interests of students at different ages — to begin with activities and materials which they enjoy, and gradually develop, from these, habits of good taste and refinement which may persist outside of school. During the last few years vigorous experimentation has been carried on to determine how success can be achieved. The progressive teacher of any of the subjects mentioned should keep in close touch with the periodical educational literature, in order to learn what progress is being made.

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CHAPTER XI

TRAINING IN EXPRESSION

Main points of the chapter. — 1. Oral and written expression concerning vital daily issues is of great social importance.

2. The first essential in training in expression is to make sure that the students have real content to express. Such content can be best secured from the content subjects or from the vocational and leisure interests of the students.

3. The second essential is to provide motive for expression through the creation of real audience situations.

4. The first step in the preparation of specific assignments or topics for expression is to assure clear thinking by the student. This is stimulated by requiring all material to be organized in the form of briefs.

5. The endeavor of the student to organize his presentation from the point of view of his audience will furnish a concrete basis for making the presentation clear, interesting, and impressive, and for using correct forms of expression.

6. The instruction in *oral* expression should be organized so as to include definite intellectual content, in order to require serious preparation by the students and to avoid waste of time in class. It is probably best to combine it with training in written composition.

7. The general principles of practice discussed in Chapter VIII should be applied to training in expression.

8. Contribution recitations in all content subjects, based on carefully prepared briefs, provide the best training in expression and do not require technical English training of the teachers.

9. The more formal aspects of English training should also be organized coöperatively between the department of English and other departments.

10. The general principles of training in expression apply to the teaching of drawing as a means of expression.

An important issue in all classes. — In this chapter we shall take up the fifth and last type of learning that is to be considered, namely, training in expression. The other types which we have discussed have been the following: (1) acquiring motor skill, (2) associating symbols and meanings, (3) reflective thinking, and (4) acquiring habits of enjoyment. These types of learning are not entirely unlike each other, and from the psychological standpoint the separation which we have made may be unwise. From the practical pedagogical standpoint, however, each type that we have distinguished serves as a useful basis for discussing methods of teaching which are especially appropriate in certain subjects. The same may be said of the type of learning that is to be discussed in this chapter, namely, expression. This type is especially important in the teaching of oral and written composition in high schools, and in some other subjects, such as drawing and painting. The psychological principles involved are primarily those of habit formation, which we have considered several times in connection with the other types of learning, but their application to training in expression raises many special pedagogical questions. Apparently this chapter should be of special interest only to teachers of English composition, but as a matter of fact, unless the principles set forth are applied by all teachers in taking advantage of the opportunities for training in expression which are offered by all subjects, the results of such training will continue to be quite unsatisfactory.

Verbal expression more important than other forms of expression. — Of the various forms of expression, *verbal* expression is the most important. This becomes evident when we consider the large part which it plays in social life, where communication through speech and writing becomes an important factor in the activities of nearly all people. The use of other forms of expression is relatively infrequent; for example, drawing, painting, and modeling are used, as a rule, only by certain specialized groups of people. Exception might be made of rough sketching and mechanical drawing, which are used by a large number of artisans and scientists.

Oral expression is as important as written expression. — When we consider the relative importance of *oral* expression and of *written* expression in ordinary social intercourse, it is evident that the former has been relatively neglected in favor of written composition in high-school instruction. Most persons employ oral expression for conveying ideas much more frequently than they do written expression. Examples are easily found in the activities of business and the professions, notably in selling and in school-teaching. In business life the dictating of letters makes training in oral expression particularly important. Hence such training should be given larger emphasis in the schools. On the other hand elocutionary training is relatively unimportant when judged by the part which it plays in the lives of most persons.

Emphasize expression of everyday matters. — In training in expression, the types of writing and speaking in which training is provided should be emphasized roughly in proportion to the extent to which each type is likely to play a part in the lives of the students who are being trained. If this is done, there will be relatively little endeavor made to train students to write novels or literary essays or criticisms and to deliver orations, but much emphasis will be placed upon the discussion, description, and explanation of everyday matters. This point of view, as far as it concerns *written* composition, is well set forth in an article entitled "The Vital in Teaching English," as follows:

> In every hundred of our pupils perhaps two will be professional writers doing newspaper or hack work; the percentage of writers of literature is inconsiderable, of course. Perhaps ten in a hundred will have occasion a few times in their lives to write for publication: a doctor or a scientist may publish a discovery or a report, a lawyer may find it desirable to present a plea to the public, and a minister

may publish a volume of sermons. . . . About forty in a hundred will write papers for missionary meetings or women's clubs, or reports for stockholders' meetings or governing bodies. The rest of the hundred, practically one-half the whole number, will write only letters, telling about Johnnie's mumps, or asking about Aunt Maria's new bonnet, or promising the shipment of certain goods, or fixing a price, or arranging a contract. If these statements seem to belittle our profession, ask yourself whether they are not true, and then be thoughtful and frank in your answer. I am not even belittling the importance of the letters that these people are to write, but I do wish to consider what are their needs in connection with the facts. Neither am I condemning these people to what you may call a narrow sphere. I am only saying that nature has made them that way, and though I cannot necessarily pick out the individual members of each class, the life around us shows that the facts will be those that I have indicated. Of course, we shall all agree that we cannot make writers of literature of any considerable percentage of our pupils. A writer of literature is always a poet, at heart, and the origin of poets is not now disputed. Yet I fear the assumption of a great deal of teaching of English has been that writers of literature could be made. (**8**: 469–483)

The point made in the preceding paragraph is simply a special application of the general point concerning the adaptation of subject matter to varying social needs, which was discussed above on pages 60–67. As pointed out on page 66, even more specific adaptations should also be made to the needs of the different types of students found in high schools in organizing the work in English composition.

Make sure that students have vital content to express. — The first factor to be considered in the organization of the actual instruction in oral or written composition is to make sure that the students have something to express. If this condition is lacking, no progress can be made. This fact seems so self-evident that it is surprising that it should ever be disregarded; yet the topics for composition in some of the old-fashioned rhetoric books indicate that the authors did not concern themselves at all with what students had to say, but chose their topics on the basis of the current interests of educated adults or what seemed to be appropriate topics for literary efforts.

Recent examples of topics from students' interests.— A list of theme topics derived from the present-day interests of high-school students is found in an article entitled "Discovering Human Interests," written in 1913. The author describes a plan which he uses for training in oral composition. Each student is expected to speak for several minutes upon a topic of special interest to himself and upon which he has made special preparation. He may specialize on a single topic or line of topics for several talks. The following are among the topics discussed, as reported by the class secretaries.

Second-Semester Students

"Captains Courageous"; The Necessity of Keeping Children at School as long as Possible; Child Labor; A Strange Cruise; Physical Training; Prevention of Cruelty to Animals; Model Aëroplanes; "With Lafayette at Yorktown"; Divers; The Going-down of the *Titanic*; Aëroplanes in War; "Under Lawton at Luzon"; Catching Baboons; Long Words; "Five Thousand Miles Underground"; Compartments for Submarines in Battleships; Motor Boats; The Princeton Meet; "Tom Swift and his Submarine"; The New Moving-Picture Plan; Baseball; The Sinking of the *Maine*; Rabbit-Hunting; The Two Great Walkers; Choice of Guns; The Coal Strike; The Business Side of a Circus; The Increase in Motor Trucks; Farm Life; The Olympic Games; The New Bandstand in Indianapolis; "Huckleberry Finn." . . .

Seventh-Semester Students

The Advantage of Having a Profession; The Panama Canal; Girard College; Music and the Piano; What Wide Reading Does for You; Painting; "The Garden of Allah"; A Town in Africa; Pigeons; How to Make Caramels; Charles B. Loomis; Brass-Craft; Playgrounds on the Piers; The Baking of a Cake; A Trip to Pennsylvania; The Manufacture of Brier Pipes; The Delights of Swimming; Cooking Cookies; Examination Questions; Milton, the Classical Student; "Il Trovatore"; Fine Needlework; A Bank that is run by Women; Pyrography; An Excursion of the History Club; Amateur Photography; Baseball; Making Peanut Brittle; Making Panocha; Scootering; My Present Aims in Life; The Preservation of Wood; Are "L'Allegro" and "Il Penseroso" Complements or Opposites? Masques; My Aims in Life; How to make Paper Wistaria; Immigration; "Winning of Barbara Worth"; A Trip to Ellis Island; Trees in Forest Park; Milton; The Arc Light; Two Modern Advertisements. (**10**: 122–124)

Classification of sources of vital topics. — A rough classification of the fields of interest or sources of theme topics which would probably appeal to high-school students is the following: 1. Topics of general public interest, such as the Panama Canal, tariff reform, public recreation, adequate support for the navy. 2. Topics from vocational interests, plans, and activities. 3. Topics from student activities and leisure activities, such as athletic contests, dances, the theater, automobiles, vacation trips, etc. 4. Topics from subjects other than English. 5. Topics from special projects.

Vocational topics. — The second group, namely, the vocational, presents some of the most vital possibilities. Examples of the development of vocational topics are given in the following quotations from an article entitled "Composition as Training in Thought."

In a class of the first year the subject "What should I consider besides Pay in accepting a Position" is proposed. A short oral discussion may be necessary in the assignment, to start the ideas of the boys. They will suggest that such considerations as the kind of work, the character of the employer, the chances for advancement, the distance of the office or factory from home, are essential. The pupils are then required to arrange these and any other topics that occur to them so that the item which for them is the weightiest will come at the end. This is the old principle of climax, but not in its usual Procrustean form. In treating each topic the boy is required to give the reasons why that consideration is for him important. The next morning the results will be various. Some Lilliputian, about four feet five inches in height and weighing nearly seventy-six pounds, will gravely declare that he would prefer not to have too much heavy work, such as piano moving, since it might make him tired before the end of the day. But there is certain to be lively discussion of the reasons for putting any subject last. The opinions will be various, but it will be found that each boy has some reasons of his own to support his arrangement. He has done some thinking.

From a fourth-year class more can be expected. The subject "My Qualifications for the Profession of Medicine" may be proposed. Coming, as it most profitably will, in a series of vocational themes, it will carry with it suggestions for attacking the problem. At any rate, do not insist on having a paragraph or section each for physical, mental, and moral characteristics or qualifications. Such imposing of adult logic and classification on the growing mind does more harm than good. The boy will probably work his qualifications out in some such manner as this: first, because he has steady nerves and can go without sleep when necessary; second, because in his high-school course he has always been most interested in biology and chemistry and like courses; third, because in his summer camping he has always carried peroxide of hydrogen, court-plaster, and sanitary bandages, and has taken great glee in treating the blisters and bruises among the boys in his house or tent. This may be accompanied by an outline, in which the various ranks of ideas are indicated by the precisely right use of Roman and Arabic numerals, if the teacher wishes to exact such detail. The essential feature is that the student be made to show that each of these is a qualification, and how, and that he be able to defend the order in which he treats the topics; that is, he must be held responsible for the consecutiveness of his ideas. (**13**: 363–364)

Topics from leisure interests and student activities. — The possibilities for theme topics chosen from the leisure interests or activities of students are easily realized. Often students who do not seem to have arrived at any serious purposes in life will have plenty to say regarding football games, school politics, plays, dances, etc.; in fact, these activities furnish the chief topics concerning which they are spontaneously expressing themselves in their everyday conversations. The chances for serious and skilled writing upon these topics is shown by the amount of material written about them in the current newspapers and magazines.

Topics from other school subjects. — Topics from the various subjects of the high-school curriculum are especially good for many students, because they are already engaged in thinking about them and are regularly expressing themselves concerning them in their class work. Hence these topics meet the first and fundamental need in composition, namely, something to say. Moreover, if the various subjects are so organized as to include subject matter that corresponds to definite social needs, the training which students receive in expressing themselves concerning this subject matter will be just the training which they need in expressing themselves concerning the fundamental issues in daily life. In the past it has often been the practice to emphasize topics chosen from literature. While this subject furnishes vital topics for some students, the other subjects, especially applied science, history, and civics, offer more interesting topics for others.

Topics secured from special projects. — Special enterprises or projects undertaken by the school as a whole or by the classes in composition may occasionally furnish vital topics for themes. This is illustrated by an "Experiment in the Teaching of High-School Composition" described in the School Review. As far as the choice of topics is concerned, the following quoted paragraphs present the essential points.

> The pupils were given the task of gathering the pioneer history of the community in the form of reports on specific topics. The particular form in which these reports were to be written was left to the originality and ingenuity of the pupils; however, they were free to consult the teachers for suggestions at any time. The pupils

were encouraged to interview the older citizens of the community, to examine monuments and relics, and to consult the county and city records, newspaper files, and printed matter relating to the early history of that particular section of the state. In every case the source of information was to be acknowledged, and quotations, when used, were to be properly marked.

The reports covered such general topics as The Character of the Earliest Settlers; Their Language; Occupations; Modes of Life; Clothing; Amusements; Social Customs; Institutions; The Development of Leading Industries; Notable Historic Undertakings; and Biographies of the Citizens who had Contributed most to the Development of the Community. Out of these general reports such specific topics as the following were chosen for individual themes: The Nationality of Our Pioneers; A Chat with the Earliest Settler; The Making of a Settlement; Cooking in Pioneer Days; The Spelling Bee; The Husking Bee; The Singing School; Courtship in Pioneer Days; Fashions in Pioneer Times; The District School; The Village Church; A Pioneer Lawsuit; The Digging of the Old Canal; The Building of the First Railroad; Trade Barons of the Early Community, etc. (**14**: 538–539)

English teacher needs broad experience, training, and point of view. — The demand that topics for themes should be chosen from a wide range of everyday interests and activities necessitates broad experience, training, and point of view on the part of the teachers of English. This point is brought out in the following statement by Professor F. T. Baker.

All teachers need to know many things outside their own field, but the teacher of English has special need of a wide range of interests. If his pupils are to learn to use their language, they will do it only through talking interestedly about real things, real ideas, real issues. Mere language is nothing; ideas in language are much. And to a high-school boy or to any man of affairs the only test of language is the effectiveness with which it does its work of conveying ideas to someone else who wants to hear them or who is made willing to hear them by the way they are put. In brief, the test of expression is that it "makes good" by establishing the desired connection between the speaker and hearer or between the writer and reader. Now it is the *material* that has the intrinsic interest, not the form; the form derives its importance only from the way in which it conveys the material (I am speaking not of poetry but of common everyday English), and the teacher of English must know many ways of helping pupils to an interest in the things around them. This is his way of stimulating the desire to speak and write, and of educating his pupils through their speaking and writing. (**3**: 342)

Students should realize that simple, sincere themes are desired. — A caution of special importance to teachers is to make it perfectly clear to students that only the products of their own efforts are desired, and that copied material is not acceptable. Students should be carefully instructed concerning the correct use of sources of information and methods of indicating indebtedness to sources. They should be made to feel that all sincere efforts at expression in their own language are commendable, and that the standards by which their themes will be judged are the average achievements of students of their age, not the productions of skilled adult writers. Neglect of these simple directions by teachers leads to discouragement on the part of many students and to dishonest copying of material by others. In order that a teacher may get correct standards which are based on the average achievements of students, it is well to have some writing done in class under careful supervision. In oral composition the teacher has a better opportunity than in written composition to arrive at correct standards for judging the efforts of immature students.

Motive for expression furnished by real audience. — The second factor in the technique of instruction in composition is the creation of real audience situations to furnish motives or stimuli to expression. This point is suggested, in the last paragraph quoted above, in the statement that "the only test of language is the effectiveness with which it does its work of conveying ideas to someone else who wants to hear them or who is made willing to hear them by the way they are put." Hence, to secure effective training in expression, students must not only have something to say, but they must feel that they have an audience to whom it is worth while to make the matter clear and interesting. The instinct of communication is so strong in most persons that it will serve as a powerful stimulus in case the audience situation is provided. It would probably be impossible to arrange for an audience other than the teacher for every theme that is written, but it could easily be arranged to have each student stimulated periodically by the idea of having his classmates as an audience. This could be done in regular turn or by chance. In any case, every student should be affected, not simply the more capable writers or speakers. If the teacher takes the right attitude, he may often succeed in stimulating the students to be interested in presenting their written material to him as constituting an appreciative audience. In oral composition the stimulus of an audience is obviously more constant and probably more effective.

New information or interpretation by student for audience. — The proper provision for topics which are related to the real live issues of the day, in which students themselves are interested, will make it easy to create real audience situations. In order to utilize these situations the following conditions should prevail: (1) the student must be interested in his topic; (2) he must have new information or interpretation to present; (3) he must try to do this effectively to the best of his ability, knowing that unprepared effort will not be tolerated.

One device for carrying out these suggestions is to permit students to specialize for some time upon one topic, reporting to the class frequently or occasionally concerning it. For example, in a class in New York City a Jewish boy who had fled from persecution in Russia related and discussed portions of his experiences from time to time. In another school a boy specialized for some time upon discussions of systems of coaching athletic teams. Another specialized on the construction and use of flying machines.

Technical administration of training. — Having provided the two most fundamental necessities for training in expression, namely, something to say and an audience to which it seems worth while to say it, the next points to be considered concern the more technical administration of the training in organizing and presenting material.

Require students to have clear ideas to express. — The first essential in the actual preparation of material to be presented is clear thinking upon the part of the student. Provided the student has a body of information that he is interested in expressing, it ought to be possible to develop some clear thinking in most cases. Obviously, however, if he has no information or content, it is futile to expect clear thinking. This furnishes an additional reason for arranging to have students specialize in expressing themselves upon topics concerning which they are quite well informed.

It is sometimes maintained that clear expression will follow as a matter of course if students have clear ideas. This is not the case, however. For example, many objective relationships may be clearly perceived and understood by a student, as in the case of the construction of an engine, but he may lack the descriptive vocabulary necessary to make these relations clear to an audience. Such a description might be difficult even for an expert in the use of language. This is shown by the necessity of using drawings and diagrams in scientific or practical treatises in order to convey the ideas which are to be expressed. But though we may admit that clear thinking may be possible without clear expression, it remains true that clear, original expression is impossible without clear thinking.

Organization in form of brief is a most essential device.— As an aid to clear thinking, the mechanical organization and arrangement of ideas upon paper in outline form is the most important device. This arrangement should vary from initial rough, hasty sketches, in terms of mere words and phrases, to a completely organized brief consisting of complete, concise statements and propositions, so paragraphed, numbered, and arranged in the form of main points and subpoints as to indicate clearly the relative rank and the degree of subordination of the various parts.

Brief is a mechanical aid to clear thinking. — The arrangement of points in order and with indentation under their appropriate headings shows up in a mechanical and almost certain way how thorough and clear the thinking of the student has been. At a glance obscurities and illogical arrangements may be detected that might easily be overlooked in a completely written paper, or that it would take some time to discover. Thus the brief is an invaluable mechanical aid to the student as a check upon his own thinking, and it is a mechanical aid and great timesaver to the teacher who reads the productions of the students.

The use of such briefs in training in expression is the most important part of the whole activity in the type of expression that is being discussed here, namely, practical descriptive, expository, and argumentative writing and speaking. If more emphasis were placed upon the organization of briefs and oral expression, and less upon completely written papers, better results would be achieved. It would probably be a good practice to have two thirds of the assigned topics treated only in the form of briefs and oral discussions, leaving the remaining third to be worked up beyond the brief stage into completely written papers. This would enable and require the students to spend their time upon careful thinking and organizing and upon concise phrasing of the essential ideas.

Student must get point of view of his audience. — Having assured clearly organized ideas upon the part of the student, the next point is to get him to take the point of view of his probable audience and to regard his material from this angle. Get him to ask himself, "How will this material appeal in its present form to the listeners or readers? Will it be clear? interesting? impressive?" These points of view may require reconstruction and reorganization of the brief, which may have been quite satisfactory from the standpoint of clearly organized thinking by the student.

Obscure exposition resulting from failure to do so. — The distinction between clear *thinking* by the expresser and clear, effective *exposition*, which is dependent upon keeping constantly in mind the point of view of the listener or reader, is illustrated constantly in daily life. Thus, in an ordinary conversational report of some event which may be perfectly clear in the mind of the speaker we commonly find many obscurities, which are usually due to two causes: first, lapses or omissions in the expression (that is, the speaker fails to relate all of the essential ideas which he has in mind); second, vague references which usually occur in the use of pronouns. These defects are often found in the discourses of conscientious and in some respects efficient teachers. The *omissions* by such speakers are particularly striking. Such omissions, as well as vague references, might be partially avoided if the speaker or writer could be trained to keep in mind the point of view of his audience and its progress in following his train of thought.

Specialized personal interest subordinated to interest of audience. — The same attitude on the part of the speaker or writer will assist in making the material interesting to the audience. He should be trained to realize that his specialized or personal interest in the subject may not be shared by them, and that his method of approach should usually be determined by their interests, not by his. This point is commonly overlooked by many amateur writers and speakers, with disastrous results. Its importance in practical affairs is illustrated in the work of the traveling salesman, who must approach his prospective buyer from the point of view of the latter's interest. It is also illustrated in political discussions, in the drama, and in many other activities.

Persuasive expression important in politics and business. — The third question that the amateur expresser should ask himself, namely, Will the presentation be impressive? is especially important in connection with certain practical activities, such as politics, salesmanship, and advertising. In such cases it is necessary not only to be clear and interesting, but also to be persuasive. The material must be arranged so as to be impressive and to inspire belief. Many students with practical or commercial tendencies would quickly appreciate this point and become interested in developing skill in persuasive writing or speaking on practical topics.

Expressions should not distract attention by peculiar form. — A fourth and final point to be considered by the student in getting the point of view of his audience is to adapt his vocabulary to theirs in such a way as to avoid distracting attention from the thought; that is, the language used should not be such as to attract undue attention in itself. Obviously, the language to be used would vary enormously with the character of the audience. If the student is writing for the general reader, he should be careful to use only forms of expression that are in good general use, and he should avoid highly specialized technical expressions and slang. On the other hand, if he is writing an account of the operation of a turbine engine, with a class of prospective engineers as an audience, his language might be quite technical; if he is writing an account of a baseball game for a class of high-school boys, it might contain a great deal of the current slang of the game.

The standard proposed in the preceding paragraph, namely, avoiding language which will distract the attention of the audience from the thought, will help in securing a rational basis for the correction of linguistic errors and will assist in the avoidance of pedantry in such correction. Obviously misspellings and the use of "I seen" and even colloquialisms like "he won't" are undesirable, because so many general readers would have their attention distracted from the thought by such expressions. On the other hand, the use of "I will" and "we will" to express simple future tense is probably justified, since only academic linguistic purists would notice the form used; the ordinary reading public would simply get the thought of future action. Similarly in regard to slang; for example, such an expression as "make good" is so generally current that the ordinary reader gets its meaning easily without any interruption of the thought and without having his attention distracted by the form of expression used.

Teachers' corrections should stress content as well as form. — If the student can be trained to keep in mind the necessity of getting the point of view of his audience, many of the formal points of rhetoric will thus be provided for. The four aspects mentioned in the preceding paragraphs are among the most important, namely, to consider whether the presentation will be clear, interesting, and impressive to the particular listeners or readers for whom it is intended, and whether the vocabulary and forms of expression used are so chosen as not to impede the thought or distract attention by their peculiarity. As far as the relation between the larger aspects of expression and its more detailed formal aspects concern the teacher, the following advice by Professor Baker is worth considering.

> Shall [the teacher] correct themes? Surely. But he must know how. He must not be fussy nor pitch his standard too high. He must not forget that it is the ideas rather than the form that are the main thing. He must not forget to put the responsibility for the form on the pupils as fast as possible, and to make them proofread their own themes. He must himself be highly enough trained not only to catch, at a rapid glance, the errors and infelicities of expression, that are, however important, still only matters of detail; he must be highly enough trained also to make, in rapid reading, valid judgments of the general qualities of thought in a pupil's work — to gauge it for soundness, clearness, proportion, interest. He must see it, indeed, as a critic sees a manuscript submitted for publication. (**3**: 343)

How to avoid snap courses in oral expression. — Training in oral expression in English classes offers certain special difficulties which are worth considering. It is not uncommon to find prescribed courses in public speaking introduced into schools by administrators or faculties who recognize the large social value in such training, but to find them abolished after a few years as required courses, owing to the unsatisfactory way in which they are administered. The chief objection is that they become "snaps" and are characterized by lack of serious preparation by the students outside of class and by waste of time listening to speakers while in class. In contrast with this condition, classes in written composition usually have the reputation of being "hard" or "heavy," and students on debating teams do very intense studying in preparation for their debates. In view of these facts, the following methods of securing more efficient training in oral expression in English classes have been suggested.

1. Give the work more definite and specific intellectual content by requiring students to investigate topics and write briefs in the same way as is done by debating teams.

2. Associate the training in oral expression with the work in written composition.

3. Require students to study and discuss important speeches, legal arguments, "selling talks," etc. from the standpoint of content, organization, and form of expression.

4. Provide some type of laboratory or class organization so that each student speaks only to a small committee or group, including the teacher, thus enabling other members of the class to be using their time in studying.

Experiments suggest superiority of combined training in oral and written composition. — The social importance of training in oral expression, and the desirability of ascertaining what results are secured when oral and written composition are combined in various ways, have led progressive teachers of English to undertake experiments to determine the most effective methods of administering the combination. One of the most significant of these experiments is the work carried on by some twenty-five high-school teachers in Illinois under the direction of a committee of which Professor J. M. Clapp was chairman. Each teacher conducted two parallel first-year classes in composition, one class taking the ordinary course in written composition and the other a course in which two thirds of the themes were oral and one third were written. The experiment was continued for a semester and produced results which were definitely in favor of the combined course in oral and written composition. The precise details of the experiment are too long to permit us to reproduce them here, but every English teacher should read the full account referred to in the bibliography at the end of this chapter. (**7** : 148–163)

A suggestive plan for organizing "Oral Composition as a Basis for Written" is described as being in use in a high school in St. Louis. (**5** : 354–361.) In the first year three periods are devoted to oral composition and one to written; in the second year, three to oral and two to written; in the third and fourth years, two to oral and two to written. The author emphasizes especially the superiority of practice under immediate supervision, which is secured in the oral method, as contrasted with the long-delayed criticism of the results of unsupervised practice, which prevails in the ordinary method of teaching written composition.

Principles of practice to be applied. — Training in expression offers opportunities for applying the general principles of practice which were discussed above in Chapter VIII (see p. 142). The application was made there to acquiring motor skill, as in tossing balls or learning to use a typewriter, and to memorizing. I know of no experimental investigations of the application of these principles to training in composition, but it would be possible to carry out the same type of investigation in this field. It would be complicated, however, owing to the difficulty of securing, for the quantitative measurement of progress, objective units corresponding to the number of letters written in typewriting or to the time consumed in memorizing. With the present condition of our knowledge we can simply conjecture or draw inferences concerning the application of the general principles of practice to training in composition. In order to do this the student should review pages 142–146 and consider to what extent the principles discussed there apply here.

The principle of assuring a correct start would need careful interpretation. Often, as applied to composition, it has been interpreted to mean absolutely correct linguistic form. Insistence upon this has killed spontaneity and overshadowed the desired initial emphasis upon real, vital content and clearly organized ideas.

The importance of the proper emotional tone, including feelings of success and satisfaction, is as great in training in expression as in any other kind of practice. Zeal and concentration of attention are also essential.

The best length of the unit to be used for theme assignments should be determined. If the principles summarized on pages 161–164 apply here, short daily periods of writing or speaking should prove to be quite helpful.

Training in expression best secured in content subjects. — In the first part of this chapter it was stated that in order to provide successful training in expression, the principles of such training should be applied by all teachers in all subjects in which students are expressing themselves. As indicated throughout this chapter, these principles concern primarily clear thinking about a body of information which the student possesses and which he is interested in discussing, and careful effort to get the point of view of his audience in order to make the presentation clear, interesting, and impressive. These principles should be applied in recitations in all subjects. If this is done and students are given opportunities to recite for two or more minutes, and are given sufficient time, when writing, to cast their thoughts into good form, the training secured in expression in the several subjects will be more influential than that secured during the specialized composition periods.

Require briefs and carefully prepared contribution recitations. — The opportunities for training in the organization of briefs and in oral expression are abundant in classes in history, literature, and applied science. In these subjects there is a large body of interesting, available material upon which special individual assignments for reports can be based. By this arrangement the two essentials, namely, vital content and the audience situations, can easily be secured. Each student prepares significant material that is new to the rest of the class, on a topic that is of general interest. The main points are organized in the form of a brief which the teacher should examine in advance in many cases. When the point in the discussion is reached upon which each student's material bears, he is called upon to present it. Such reports may vary from two or three minutes to thirty minutes in length. The longer reports should be presented only after several individual conferences with the teacher.

In classes where the teacher is skilled in organizing such contribution recitations, the efficiency developed in oral exposition by the students is surprising to one who has never seen the method used. If in any school the teachers of English, the principal, and the teachers of the content subjects who have some skill or interest in organizing such training as has been described would get together and plan to make the training as efficient as possible, certain standard conditions would be developed which would assure much more valuable results in oral and written expression than could possibly be secured by the most efficient English department working alone.

Coöperating teachers do not need technical skill in English. — One special advantage of this scheme for coöperative training in expression is that it does not demand of the teachers of the content subjects knowledge of the technical points in grammar and rhetoric. It simply requires that each teacher be able to assist students in securing clear, interesting, and impressive presentations of material with which the teacher is familiar. As a preliminary step to this presentation the scheme requires the checking up and criticizing of carefully organized briefs as objective evidence of the investigating, thinking, and organizing which has been done by the students. Many teachers who would be unsuccessful in detecting the less glaring grammatical errors would be entirely capable of administering this scheme. I have seen it used successfully in high school, and have always used it in some of my own classes. Other aspects of it will be discussed in a later chapter. We are concerned here only with the opportunities which it offers for training in expression.

Coöperation in formal training by reference to English department. — Coöperative training in the more formal aspects of expression should also be organized in high-school classes. Only competent teachers of English, however, are capable of administering these more technical aspects of the training, but the teaching should be so organized as to bring their skill to bear upon the productions of the students in all of the classes. The possibilities of successfully organizing such a scheme are discussed at length by J. F. Hosic in an article entitled "Coöperation of all Departments in the Teaching of English Composition." Descriptions of two examples of successful plans are given and should be read by students. The final paragraph sums up the matter in the following words:

> To summarize: Coöperation in English composition, to be successful, must be organized and administered by the head of the school for the good of all. This will involve the setting-up of common aims and the establishing of suitable working conditions. Instruction in the technique of speaking and writing should be regarded as the work of the teachers of English. Teachers of other

subjects should refuse to accept oral reports or written papers which are below the standards agreed upon. If the delinquent student fails to repair the deficiency, he should be reported to the principal and sent to the English department for further training. In matters of substance, particularly clearness and completeness, the teacher of each subject should point out the weakness, cause it to be removed, and apportion credit to the paper in accordance with the degree of success attained. By means of class visitation and conference, teachers of English and of other subjects should seek to join their efforts so as to accomplish the most effective training of the student in the arts of study and of expression with the greatest economy of his time and the most consistent unifying of his life. (**12** : 607)

Need simple manuals of the essentials of English expression. — For all who are concerned in training in verbal expression (namely, teachers of English, coöperating teachers in other subjects, and students) there is needed a simple text or syllabus of the most essential points to be observed. Most grammars, rhetorics, stylebooks, and manuals for writers have been too complete and too technical to be of much service to the persons mentioned in the preceding sentence. Even teachers of English in high schools are often quite untrained for their special work, and the books which they use with the students become in their hands primarily compendiums of information to be learned, instead of manuals to guide and improve practice. Such books are even less useful for coöperating teachers and for students. Teachers in large city high schools or large, well-organized normal schools, who are administering successful coöperative schemes for training in verbal expression, would perform a very useful service for other teachers by preparing such manuals of the essentials in expression, in such a form as to be of real practical use to high-school students. They should be notable for what they omit as well as for what they contain. (See **13 *a*** for an example of a good manual of practice.)

General principles of expression apply to drawing. — Up to this point we have been concerned primarily with training in oral and written expression. As stated in the beginning of the chapter, there is only one other type of expression that is in sufficiently general use to justify discussing it in this chapter, namely, drawing, or graphic expression. Many of the same principles as have been advanced in discussing verbal expression would apply to graphic expression. This would be true of the following principles: (1) to provide vital content; (2) to make sure that the pupils have clear ideas to be expressed; (3) to provide an audience situation; (4) to apply the rules of practice; (5) to coöperate with other departments in which drawing would be a really useful instrument of expression. Obviously the application of these principles involves regarding drawing primarily as an instrument of expression. Very often drawing is taught simply as the mastery of a technique of producing æsthetically pleasing effects, the initial stages in the training involving almost no vital content of the same order as is expressed in language. Such a method of teaching drawing parallels very closely the purely formal linguistic methods to which reference was made above. From the standpoint of recent progressive developments in general educational theory and in the teaching of drawing it would seem that the teaching of this subject according to the general principles of training in expression advocated above would be much more successful with general students than the formal methods of teaching would be. A somewhat technical contrast of the two methods is presented in the following review, by Professor Walter Sargent, of a book on the teaching of art.

> [The author] designates [his] plan as a synthetic method — a method of building up given material, such as lines, shapes, tones, and colors, into forms of æsthetic expression. This method is contrasted with what is termed the analytic or academic method, which consists in drawing from nature to acquire a knowledge of facts of

appearance, and skill in representing these facts. Following the analytic method, the student would begin by observing and recording facts of appearance, to be used later as a medium of expression. By the synthetic method the student begins by arranging lines, shapes, and tones so as to build up harmonious combinations. He accompanies this practice with drawing from nature in order to obtain data to render these lines and shapes significant in expression as well as beautiful in arrangement.

[The author] has rendered an important service to art education in thus sharply contrasting the interest in recording objective facts as they appear to the eye with the interest in harmonious arrangement of forms so that they produce æsthetic satisfaction. He rightly insists that the principles of arrangement of lines, spaces, and tones have a logic of their own, which produces æsthetic pleasure and which is in large degree distinct from any consideration of the subject matter which those lines represent. He emphasizes the truth that no amount of industry or skill along the line of literal representation can by itself produce the full range of artistic expression.

The principles expressed in the book are concretely set forth in a series of exercises suitable for different grades and adapted to give acquaintance with, and ability to use, the elements of artistic expression.

While accepting [the author's] distinction between the interest in representing appearances and the interest in harmonious arrangement of form, one questions whether a certain loss to art would not result from limiting the value of literal drawing from objects merely to that of securing data to give significance to compositions which would otherwise be abstract, and whether practice in conscientious analysis of actual appearances has not made a contribution to art which the approach by principles of design does not include. The history of art seems to indicate that the close study of a bit of reality in order to lay hold upon its meaning and transcribe its characteristics without regard to artistic composition often leads one beyond the scientific interest in securing information and into an interest in the individual significance of that object, into a sympathetic attitude toward that particular portion of reality, and thus into a genuine æsthetic experience of a sort which initiates the style of expression and does not merely furnish data to make significant the otherwise abstract elements of a decorative convention. (**15**: 455)

Drawing used as an aid in various subjects. — It has become quite common to use drawing as an aid in studying the biological sciences (botany, zoölogy, etc.), but there are possibilities of using it as an aid in other subjects, of which advantage is not ordinarily taken. In geography the representation of contours by contour lines and by shaded pencil or chalk drawings is very helpful. In history, maps of various sorts and sketches of buildings, weapons, etc. may be made by the students to advantage. In technical high schools where students are given training in drawing, coöperative teaching which utilizes such opportunities as have been mentioned is not uncommon. In other high schools the opportunities to use drawing as a means of expression in the various subjects are commonly neglected.

Conclusion of discussion of training in expression. — This will conclude our discussion of training in expression. We have emphasized the social importance of such training, and have indicated that efficient methods of instruction in expression must take their point of departure from the discussion by students of fundamental, vital issues which are worthy of presentation in a clear, interesting, and impressive manner to the class as a real audience. The best training can be secured by the organization of standardized "contribution recitations" in all of the content subjects. In the regular English classes topics chosen from these other subjects and from the vocational and leisure interests of the students can be used effectively. In all cases clear thinking, which is stimulated and assisted by the organization of material in the form of briefs, is fundamental in the preparation of material for presentation.

This chapter will conclude our discussion of the five special aspects or types of learning which we have distinguished, namely, acquiring motor skill, associating symbols and meanings, reflective thinking, acquiring habits of enjoyment, and acquiring skill in expression. In the next two chapters we shall continue the discussion of the learning process, in some of its more general aspects, under the headings self-activity and apperception, and changes in methods of learning with increasing age of the students.

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Additional bibliography. — Extensive additions to this bibliography plus many references on training in the enjoyment of reading are given in *Exercises for "Methods of Teaching in High Schools,"* pp. E139–E140 and E155.

EXERCISES

For problems for class discussion of Chapter XI, see *Exercises for "Methods of Teaching in High Schools,"* pp. E142–E154. These pages, together with pp. E117–E139, contain much supplementary material of interest to teachers of English. It includes poems, cartoons, a stenographic report of a high-school lesson, and a report of the voluntary reading done by some eight hundred high-school pupils.

CHAPTER XII

SELF-ACTIVITY AND APPERCEPTION

Main points of the chapter. — 1. The principles of self-activity and apperception apply to all of the special types of learning discussed in the preceding chapters.

2. To apply the principle of self-activity (namely, that the student is educated by his own responses), the teacher must make sure that the type of mental response or mental activity expected of the pupil has actually occurred.

3. The student's words are often unreliable evidence of his mental processes.

4. *Apperception* is used here to designate the general fact that an individual's response to a given stimulus is determined by (*a*) his past experience and (*b*) his present frame of mind.

5. The teacher must be sure that the exercises in all types of learning are adapted to the past experience and stage of development of the student, in order to call forth the desired responses.

6. The teacher must also endeavor to put the student in the frame of mind best suited to the particular type of mental response which is desired or expected at the time.

Explicit treatment to supplement earlier references. — In this chapter we shall take up briefly two general aspects of the learning process, namely, self-activity and the principle of apperception. These aspects have been referred to incidentally in the preceding chapters which deal with special types of learning, but it is desirable to give them more explicit treatment here in order to bring out their more general meaning and application.

Self-activity: student is educated by his own responses. — The first principle, namely, that designated by the term *self-activity*, means the general fact that students are educated by their own mental responses, not by the stimuli or influences provided by the teacher. The latter are influential in determining the individual's character only through the responses which they arouse. If the desired educative response is not made by the student's mind, the stimulus is not educative. Obvious illustrations are found by comparing the responses of students who are inattentive with those of students who are alert, thoughtful, and attentive. In both cases the teacher's words or the words in the book affect the sense organs in similar ways. In the case of the inattentive student, however, the words " go in one ear and out the other." They arouse little mental response; hence they are not grasped or retained. On the other hand, the alert, attentive student responds actively by grasping the stimulus and working it over. His mental response is large or intense, and, if worth while, it is educative.

Self-activity in various types of learning. *Motor skill.*— As stated above, this influence of the student's own responses has been referred to in the discussion of each special type of learning. Thus, in acquiring motor skill it is obvious that the student learns through doing—for example, by actual practice in tossing balls or using the typewriter. However, it is not simply the physical act that develops his skill, but the mental control. A student would make little progress from simply having the teacher hold his (the student's) hands or fingers and put them through the movements. This is evident to a learner when someone tries to teach him a tennis or golf or swimming stroke by guiding his arms. It may help somewhat in enabling the individual to recognize the desired movement when he succeeds in making it by trial and error. This was shown by Bair's experiments on electrically stimulating the movements of the ears (see above, p. 103). But such a stimulation did not enable the learner to proceed to make the movement. It did help him to recognize and select it after he had succeeded in making it as the result of trial and error. In general, the mental impulse to the movement and the critical evaluation, by the learner, of its form and result are the important factors in acquiring motor skill and are clear illustrations of the principle of self-activity.

Learning a vocabulary. — Similarly, in learning a foreign language by the direct method it is not sufficient simply to provide the proper stimulus, namely, "meaning plus foreign symbol." It is desirable that the student have abundant opportunity to initiate the response "foreign symbol" to a meaning which he has in mind to express, or to initiate the response "meaning" to a foreign symbol which has been presented (see above, p. 125, for diagrams). Although these ends can be secured by silent study, they are most surely secured by giving students ample opportunities to speak the foreign tongue. Hence, we noted that the teacher of a foreign language should suppress any tendency to monopolize the time in class and should make all students talk as much as possible.

Practice. — In our discussion of practice or drill we noticed that progress in learning was rapid only when the learner was concentrating his attention on the process — that is, when his mental response was active and intense. Mere mechanical fingering of the typewriter did not increase his speed. Similarly, in memorizing, we noticed that all conditions which increased the concentration of attention increased correspondingly the speed or economy in learning.

Reflective thinking. — In discussing reflective thinking we noted especially the necessity of giving the slow pupils opportunity to do active problem-solving and analytical selective thinking. In teaching geometry, for example, if we desire to secure training in reasoning we must get the pupils to be self-actively reasoning (that is, to be making mental responses of this type). This can be done only by proceeding through the first book of the geometry very slowly, treating most propositions as exercises or problems to be solved, not merely as proofs to be learned. When the ordinary method of merely having students learn the proofs or demonstrations is followed, the alert, rapid, original thinker may anticipate or supplement the reasoning done by the teacher or outlined in the textbook to such an extent that he is constantly making the reasoned mental responses which are contemplated in the training. This is not the case, however, with the slow, unoriginal thinker who merely memorizes the proofs.

Acquiring habits of enjoyment. — In discussing the development of habits of enjoyment we noted that actual mental responses of enjoyment are the essential factor throughout the process — not some other type of response, such as information, or conversation, or disgust.

Training in expression. — Similarly, in discussing training in expression, in the immediately preceding chapter, it was shown that the essential educative situation is "the student with ideas of his own to express plus independent recall of words with which to express them"; that is, the essential educative mental response in training in expression is the making, by the student, of the connection between ideas and words. Unless he is self-actively doing this, he is not securing economical effective training in expression.

To recapitulate, in various types of training we wish to secure certain special forms of mental response — control in motor skill, association of symbols and meanings, reflective thinking, enjoyment, expression. In applying the principle of self-activity we must make sure that the desired response by the student is actually made. If it occurs in an intense form (that is, associated with zeal and concentration of attention), it is more effective.

Student's words often unreliable evidence of his mental activity. — Ordinarily, in teaching that aims to secure responses of meaning, or active reflective thought, or enjoyment, or expression, the teacher must judge, by the words which the student utters, whether the desired mental response has been made; that is, the student speaks or writes, and the teacher infers from this that a certain type of mental response has preceded. Very often the inference by the teacher is incorrect. Thus, a student repeats the definition of a technical abstract term. The teacher assumes that he has its meaning in mind, but this may not be true. In geometry a student reproduces a geometry proof. It is generally assumed that he has made the desired mental response, namely, reflective thinking. Very commonly he has not; instead he has simply memorized figures, words, and other symbols. While aiming to secure enjoyment the teacher gets from the student information about a book and assumes that it is evidence of enjoyment. The emotional response may have been just the opposite. In training in composition, a student hands in a theme and the teacher assumes that it is the expression of the student's own experiences or ideas, in his own words; instead, it may be simply a copy of material found in a book.

Teacher must skillfully keep check on individual's responses. — In view of these facts the teacher must be constantly alert to make sure that the desired mental response is made by every pupil. To do this requires great skill and ingenuity, and a large part of the time spent in school should be devoted to getting a check upon and directing the mental responses of *individuals*. The methods of doing this economically and effectively will be discussed in later chapters on individual instruction and supervised study.

Apperception: response determined by past experience and by present frame of mind. — The responses which a student makes will depend upon two factors; namely, (1) his past experience and (2) his present frame of mind. This statement is known as the principle of apperception, and the teacher should keep it constantly in mind in planning and administering instruction which is intended to secure certain specific educative responses.

Illustrated by varied interpretations of words. — A few examples will make clear the influence of the two factors; namely, past experience and the present frame of mind. The influence of past experience in determining the responses to a given stimulus is commonly illustrated by the different mental responses made to the same word by persons of different training. A stock example is the interpretation of the word *bay* when heard by a horse dealer, a carpenter, a boy studying geography, and a student of domestic science (the latter may think of the bay leaf used in seasoning). The influence of the present frame of mind may be illustrated by the same word, because we can be sure of quite similar mental responses from all of these persons if we say, "Students in geography must be able to define lake, river, *bay*, etc." The first part of the sentence tends to put them in similar frames of mind, so that they all think of *bay* as a body of water. The student can readily think of many other homonyms that will illustrate the same general fact of apperception.

Emotional responses also illustrate apperception. — Other types of mental response than the intellectual may also be used to illustrate the principle of apperception. For example, owing to differences in previous experience, the emotional responses aroused in the minds of Northerners and Southerners during the Civil War were quite different when such words as *Lincoln*, *Jefferson Davis*, *abolition*, *states' rights*, etc. were heard. The influence of the present frame of mind in determining an emotional response is shown by the type of casual greeting extended to a friend when meeting him during the hurly-burly of business hours, as contrasted with the enthusiastic, interested attitude when meeting him during leisure time.

Influence of past experience. *Teacher must consider the student's vocabulary.* — The first pedagogical point to notice in connection with the principle of apperception is that the teacher should carefully ascertain whether students have had the past experience necessary to provide the desired responses. This is most easily illustrated in connection with students understanding the meanings of words used in instruction. The vocabularies of students of different ages and training vary enormously, and a teacher often fails to realize that words which he understands are strange to the students. Consider, for example, the following ordinary words, which are arranged roughly in the order of decreasing familiarity: pink, fifty, anger, sympathy, number, dumbwaiter, pollen, virtue, justice, momentum, aftermath, scenario, scholasticism, nominalism, fourth dimension, apperception. A college graduate would probably understand all of these and be able to use most of them, but most high-school students would lack the past experience necessary to an understanding of several of the words toward the end of the list. Some children entering the primary grades might not understand any of them.

Meanings of words are secured only through relevant experiences. — The general fact concerning the dependence upon experience for the meanings of words is discussed by Dewey as follows:

> [Words or symbols] stand for [their] meanings to any individual only when he has had *experience* of some situation to which these meanings are actually relevant. Words can detach and preserve a meaning only when the meaning has been first involved in our own direct intercourse with things. To attempt to give a meaning through a word alone, without any dealings with a thing, is to deprive the word of intelligible signification; against this attempt (a tendency only too prevalent in education) reformers have protested. Moreover, there is a tendency to assume that whenever there is a definite word or form of speech there is also a definite idea, while, as a matter of fact, adults and children alike are capable of using even precise verbal formulæ with only the vaguest and most confused sense of what they mean. Genuine ignorance is more profitable because likely to be accompanied by humility, curiosity, and

open-mindedness, while ability to repeat catch phrases, cant terms, familiar propositions, gives the conceit of learning and coats the mind with a varnish waterproof to new ideas. (**4**: 176–177)

Examples of misinterpretation of historical statement. — There are hundreds of current examples of the failure of students to get the meanings of statements which they learn in their lessons and recite glibly to the teacher. For instance, a prominent American educator relates that in the upper grades of the elementary school he learned the statement that the invention of the cotton gin fastened slavery upon the South. The only gin of which he had any knowledge was the liquor to which he had heard his parents refer as being a terrible thing to drink. Hence he concluded that the invention of a liquor made from cotton, which was known as cotton gin and drunk by the negroes, somehow fastened slavery upon the South. In later years he contrasted the way he was taught with the modern method of making clear to students the difficulties of separating cotton from the seeds and the various stages in the development of ginning machinery.

All instruction must be adapted to experience and development of students. — The phase of the principle of apperception which we have been discussing is easily applied in detail to high-school instruction. Since all instruction must be adapted to the past experience of the students, we must make sure that they have had the detailed personal experiences necessary to enable them to grasp the abstract and general meanings which we may be trying to teach; that the problems which we expect them to solve involve relationships with which they are familiar and which are within the range of their ability; that the music and literature which they are expected to enjoy are adapted to the stage of development that they have reached, that is, are built upon the habits of enjoyment which they already possess; and that topics for themes are drawn from the typical activities of adolescent boys and girls.

Endeavor to utilize out-of-school experiences. — To make these applications skillfully it is necessary for the high-school teacher to become a close student of the characteristics and experiences of high-school students, not only in school but out of school. The necessity of linking up instruction with out-of-school experiences is emphasized by Dewey in the following quotation:

> All students of psychology are familiar with the principle of apperception — that we assimilate new material with what we have digested and retained from prior experiences. Now the "apperceptive basis" of material furnished by teacher and textbook should be found as far as possible in what the learner has derived from more direct forms of his own experience. There is a tendency to connect material of the schoolroom simply with the material of prior school lessons, instead of linking it to what the pupil has acquired in his out-of-school experience. The teacher says, "Do you not remember what we learned from the book last week?" instead of saying, "Do you not recall such and such a thing that you have seen or heard?" As a result there are built up detached and independent systems of school knowledge that inertly overlay the ordinary systems of experience instead of reacting to enlarge and refine them. Pupils are taught to live in two separate worlds, one the world of out-of-school experience, the other the world of books and lessons. (**4** : 199)

Influence of present frame of mind. *Example of mistake in reading.* — We shall now turn from the discussion of the influence of past experience to a consideration of the second factor in determining a person's response to a situation; namely, his present frame of mind. This was illustrated above in connection with the word *bay*, but additional examples may be given here to assist in getting the idea clearly in mind. The following incident from my own experience will serve this purpose.

> I was riding in a train and happened to look over the shoulder of the man in front of me at the newspaper which he was reading.

I could just see the top of the paper and read there the following large headline, extending clear across the page:

GOOD HATS A QUARTER

Inasmuch as I always take advantage of end-of-the-season reduction sales of men's furnishings, this statement interested me (although good hats for a quarter seemed impossible) and I decided to look into the matter further when I got a chance. Soon the man left his seat to go into the smoking car. I picked up his paper and, turning to the desired page, found that instead of reading

GOOD HATS A QUARTER

the headline read

GOD HATES A QUITTER

It was Monday morning, and the paper in question contained reports of Sunday sermons printed with large-type headlines running clear across the page. If I had been in the religious frame of mind at the time, instead of the bargain-hunting frame of mind, I might have read the headline correctly at the first glance.

Present mental background determines interpretation. — The whole matter of the influence of mental backgrounds upon the interpretation of a given stimulus is well discussed by Adams in his "Exposition and Illustration in Teaching." He says that an idea

> must take a different meaning according to the mental background against which it is projected. The presented content may be quite neutral or it may have a positive tone of its own [to use terms borrowed from the field of color]. In both cases the new idea or ideas must submit to a modification of tone or meaning from the effect of the background.
>
> Take some such colorless sentence as "Think of him," and note the difference effected by projecting it against the following backgrounds:
>
> A picture in *Life* of a low-class photographer trying to encourage a pleasant expression on his female sitter's face.
>
> A widow laying flowers on a grave and addressing her little girl.

A religious revival meeting.

A French schoolmaster during the Franco-Prussian War pointing to a portrait of the first Napoleon.

A conspirators' meeting where a traitor's name has been mentioned.

A crowd of starving "unemployed" watching the mayor pass from his carriage to a city banquet. (**1** : 93)

Examples of students misinterpreting questions. — Pedagogical examples of the principle that an individual's mental response is influenced by his present frame of mind are numerous. Even when the students have had the adequate past experience for making the desired response, it is often not secured by the teacher, because the present mental conditions are unfavorable. Hence, Adams says:

> Young teachers in particular soon discover that their questions do not produce the answers they were intended to elicit. A question is asked, for example, the answer to which is known to be within the range of the pupil's knowledge. There is no doubt about the matter. The teacher knows from immediately preceding experience that the answer is in the pupil's mind only waiting to be drawn out. Indeed, the question may be fairly regarded as nothing more than a stage in the process of making clear and distinct an idea that the pupil already possesses, though in a vague way. The question is, however, so expressed that the pupil, with the best intention in the world, cannot discover against which background he is expected to project the ideas concerned. Accordingly he projects them against the first available background, in the hope that this may be the right one.
>
> "Where was St. Paul converted?" asks the teacher, speaking from a geographical background. "In the ninth chapter of the Acts," responds the pupil, from a background of textual reference. In testing the intelligence of a class the inspector asks, "Where do you find gates?" The pupil, from a background made up of puzzling experiences of the Socratic method, answers: "We don't find gates; we make them." From a historico-geographical background the inspector desired to elicit the deleterious effect of a

large town on the purity of a river. He brought out the fact that Robert the Bruce [1274–1329] spent his latter years at Roseneath on the Clyde in Scotland, and that as a recreation he very probably — according to the inspector — fished in the river. The question that was to incriminate those who were responsible for the pollution of the Clyde took the form, "Why could n't the Bruce fish there now?" From a background of plain common sense came the reply, "Because he 's dead." (**1**: 96)

Teacher must put students in proper frame of mind. — These examples make it evident that it is the teacher's business to see that pupils are put into the proper frame of mind to make the general type of educative responses that he desires. This is particularly important (1) at the beginning of a period of instruction, (2) in taking up a new topic, (3) in making transitions in the continuous treatment of a topic. In the case of intellectual instruction such a preparation of the pupil's mind commonly involves an introductory or transitional discussion which will inform the students concerning the purposes of the lesson, the problems to be discussed, their general significance or bearing, etc. This notion of preparation was especially emphasized by Herbart (1776–1841), the great German educational reformer, and by his followers. One of Herbart's statements concerning the matter is the following:

> A rule of vital importance is that, before setting his pupils at work, the teacher should take them into the field of ideas wherein their work is to be done. He can accomplish this at the beginning of a recitation hour by means of a brief outline view of the ground to be covered in the lesson or lecture.

Preparatory step may include discussion of purpose of lesson. — The technique of the initial, or preparatory, step in the teaching of lessons has been very extensively discussed by the followers of Herbart. Their contention has usually taken the form of an assertion that the aim of the lesson should be stated at the beginning and should be considered until it is clearly appreciated by the students. If this contention is interpreted in a common-sense way and the discussion of the aim provided when necessary, it establishes a good practice. Sometimes, however, the idea is carried out so formally and insistently that the real psychological purpose of the step is lost sight of and it becomes a mere pedagogic rite. As an extreme example of such a situation Adams cites the case of a German Herbartian teacher who began with the following statement of the aim: "Our object in to-day's lesson is to see what happened next."

Student should know whither he is going.—The following rule stated by Adams presents a safe and desirable basis for administering the step of preparation. "The essential point is that the pupil should know whither he is going, so that he may coöperate with the teacher and do his fair share of the work." Very often students at the beginning of a period will have in mind the discussion that is to be continued from a previous period, and will take up and pursue the line of thought effectively without a restatement of the aim of the discussion. The teacher, however, should always remember to make sure that the appropriate initial mental attitude does exist as described by Adams.

In reflective thought the problem must be realized.—The importance of keeping the aim of the lesson clearly in mind when the purpose is the solution of a problem has already been discussed at length in the chapter on reflective thinking (see p. 185) and need not be repeated here. The following statement from Dewey's "How We Think" will serve to recall to the student the general point of departure for instruction which involves reflective thought.

> The best, indeed the only, preparation is arousal to a perception of something that needs explanation—something unexpected, puzzling, peculiar. When the feeling of a genuine perplexity lays hold of any mind (no matter how the feeling arises), that mind is alert and inquiring, because stimulated from within. The shock, the bite,

> of a question will force the mind to go wherever it is capable of going, better than will the most ingenious pedagogical devices unaccompanied by this mental ardor. It is the sense of a problem that forces the mind to a survey and recall of the past to discover what the question means and how it may be dealt with. (**4**: 207)

Avoid undesirable elaboration of preparatory step. — Dewey continues his discussion by giving certain cautions concerning the tendency to elaborate the preparatory step beyond reasonable limits. The teacher or reader who is interested in a more thorough critical treatment of this phase of method should read Dewey's discussion and compare it with pages 81–117 in McMurry's "Method of the Recitation."

Main issue or problem not always approached directly. — Adams, writing in 1910, presents some examples to show that even in reflective thinking or problem-solving the main issue need not always be presented at the beginning, but instead some minor problem may be taken up which will serve as a more interesting or significant approach to the main issue than would a direct statement of the main problem in its abstract form. Thus, he says:

> The expositor [the teacher in this case] wishes to produce a certain arrangement of ideas in the mind of another; the beginning that lends itself best to the production of this arrangement is the best.
>
> The teacher in an English school begins, for instance, with a blackboard full of figures from the Board of Trade returns for the past ten years, from which the pupils are invited to discover which are Britain's best customers in the matter of buying her goods. Various ups and downs are noticed and causes suggested. One sudden fall is unaccounted for. Toward the end of 1906 Italy began to buy a good deal less from Britain. The fall is not temporary, for there has been no corresponding rise since. Italy is not hostile to Britain; rather the contrary. The cause must be sought elsewhere. More figures are submitted, from which it appears that what Britain has lost, Germany has gained. But why this sudden

change? Germany is no nearer Italy than it was before; there has been no quarrel with British goods; the Germans may be better at pushing goods, but there was no sudden increase in their superiority at that time. Gradually the search is narrowed down to something peculiar that belonged to that year, and the opening of the Simplon Tunnel [through the Alps] in May, 1906, is suggested. Since this beginning occurs in a lesson in commercial geography, the tunnel is approached from the proper point. . . .

A problem of this kind is often an excellent way of beginning an exposition. Instead of starting straightway with the subject of the difference between the development of the feudal system in England and in France, the problem might be suggested, Why are there hedgerows in England and not in France? In answering this interesting question all the essential points of difference emerge, and the incentive of a well-defined purpose is maintained throughout the lesson. (**1**: 181–182)

Preparatory step in other types of learning. — The examples so far given have practically all been illustrations of putting the pupil in the right frame of mind for *reflective thinking*. This is the type of learning that is commonly stressed in discussions of the preparatory step in the giving of lessons. What shall be said, however, about the other four types of learning which we discussed; namely, acquiring motor skill, learning a foreign vocabulary, acquiring habits of enjoyment, and training in expression? Obviously, the clear realization of a problem to be solved is not usually the proper initial frame of mind for instruction along these lines.

Motor skill and learning a foreign vocabulary. — In the cases of acquiring motor skill and learning a vocabulary the mental conditions which are favorable to securing the desired responses are primarily those of attention and interest in improvement. If a person who is learning to play golf or use a typewriter, or who is learning to speak German, can be brought to attack the situation with interest and concentration of attention, this is about all that can be done to put him into the right frame of mind.

Enjoyment.—In the case of forming habits of enjoyment, again it is primarily a matter of putting the learner in the right general mood. The general emotional atmosphere of the schoolroom should be that of pleasant entertainment. Certainly a generally sour, fault-finding, ill-tempered attitude on the part of the teacher would interfere seriously with the arousal of the responses of enjoyment which are contemplated in the training. In the chapter on acquiring habits of enjoyment this influence of the teacher's attitude was discussed at length. Perhaps the best condition is that indicated by an English teacher who said to me in the hall after class, "We had a good time with one of Shelley's poems in that class to-day." As for securing the more delicate or refined emotional effects which are possible in connection with literature, the teacher has the same opportunities that a skilled dramatist or actor has in developing a general mental setting, or background, that will be favorable to bringing out the specific emotional responses desired from the pupils at various points in the reading. Very often the teaching can be made much more effective by making sure of such a mental setting at the beginning of the period, before actually undertaking the reading. An example of such a treatment of Gray's "Elegy written in a Country Churchyard" is given in McMurry's "Method of the Recitation" (pp. 86–88). Concerning the nature of the mental setting, or background, to be arranged for any particular piece of literature there would probably be considerable disagreement among teachers, but this fact does not controvert the general desirability of endeavoring to put students into the proper frame of mind to facilitate the emotional responses which are desired. Favorable mental conditions for enjoying music, games, dancing, etc. might be considered by readers interested in these lines.

Expression.—As stated in the preceding chapter, in training in expression the essential frame of mind in which to put the student is one in which he feels that he has information or interpretation which he is interested in communicating effectively to an audience as being of interest to them and worthy of their attention. To secure this mental condition upon the part of each student requires special skill of teachers, and some possess a special technique of assigning themes so as to produce such a favorable mental attitude. To secure the desired attitude in the cases of students who have little talent for linguistic expression and little confidence in themselves is indeed a work of pedagogical art.

Conclusion of discussion of self-activity and apperception. — This will conclude our discussion of the closely related principles of self-activity and apperception. The former designates the fact that it is the pupil's responses that educate him; hence the teacher must be skilled in assuring the specific mental responses desired for various educational purposes. The second principle, that of apperception, describes the general conditions determining the responses that pupils will make; namely, the influences of (1) past experience and (2) the present frame of mind. In taking account of the first of these conditions the teacher must become well informed concerning the experiences and development of his pupils and see that the instruction is adapted to these. In taking account of the influence of the second factor, namely, the present frame of mind, the teacher will endeavor to bring about in the pupils an attitude favorable to the solving of a problem, the enjoyment of a poem, or whatever type of learning may be undertaken at the time.

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6. PARKER, S. C. *History of Modern Elementary Education.* (Ginn and Company, 1912.) Pp. 395–397. Brief historical statement concerning apperception.

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8. THORNDIKE, E. L. *Principles of Teaching.* (A. G. Seiler, 1906.) Pp. 39–50. Illuminating study of self-activity and apperception by means of many practical problems to be solved by students.

EXERCISES

For problems for class discussion of Chapter XII, see *Exercises for "Methods of Teaching in High Schools,"* pp. E158–E174. These pages include portions of stenographic reports of high-school lessons, cartoons, pictures, and a poem with excerpts from textbooks in mathematics and history to illustrate apperception and preparation in teaching.

CHAPTER XIII

INFLUENCE OF AGE ON LEARNING

Main points of the chapter. — 1. It is commonly maintained that the age from six to fourteen is the best age for learning a language and for acquiring motor skill, and that adolescence is the golden age for reasoning.

2. In opposition to this general point of view this chapter maintains that all types of learning are important at all ages.

3. On the basis of scientific investigations of facility in memorizing, it is maintained here that a foreign vocabulary can be acquired as economically and effectively during the later years of the period from six to eighteen as during any other years of this period.

4. Upon grounds of social economy it is maintained here that the learning of a foreign language should be postponed in most cases until the probabilities become large that the students who begin it will eventually use it as a practical tool.

5. Upon the basis of experimental investigations it is maintained here that children in the elementary school carry on reflective, analytical, abstract, generalized, reasoned thinking in the same general manner as high-school students do; hence the general principles of training in reflective thinking apply in both cases.

6. The same general point of view described above is maintained here in the cases of training in enjoyment and training in expression. The development of the sex instinct, with its secondary characteristics in adolescence, presents an additional instinctive factor which must be considered in these two types of learning, but it does not modify the general principles of such learning.

Do students at different ages vary in ability to learn? — A phase of the learning process that needs brief consideration is the extent to which different types of learning prevail at different ages, and the extent to which changes in the capacity for carrying on each type of learning occur with increasing age. In other words, is there any age, from the primary grades to high-school graduation, that is characterized by marked and peculiar superiority in the capacity to acquire motor skill? to learn a foreign vocabulary? to reason? to acquire habits of enjoyment? to acquire habits of expression?

Is age from six to twelve for acquisition and adolescence for reasoning? — The practical importance of these questions is suggested by the contention of some educational theorists that younger students memorize more readily than older students, and that children do not reason until about twelve years of age. Upon this basis they argue that the age before twelve is the age for acquisition, and that instruction then should be characterized by "arbitrary memorization, drill, and habituation," but that adolescence is the golden age for methods of instruction which require students to reason.

Consider each type of learning. — We shall take up each type of learning from the standpoint of the influence of age, before college entrance, upon facility of learning. In some cases we shall have evidence from experimental psychology to present; in other cases the argument presented will be largely a matter of opinion.

Acquiring motor skill. *Ordinarily assumed that younger students learn more readily.* — The first question which we shall consider is this: Are any of the years from six to eighteen especially favorable for learning to swim, to play tennis or basket ball, to manipulate a typewriter, to pronounce a foreign language? The ordinary dogmatic answer has been, in the cases of learning to swim and to pronounce a foreign language, that the learning should begin in childhood (presumably from six to fourteen years of age) if skill is to be acquired economically and effectively. In the case of the other activities mentioned we have little published opinion.

Maintained here that adolescence is as favorable for motor learning. — In opposition to the ordinary opinion stated above, we shall maintain that, of the years from six to eighteen, the later years are just as favorable for acquiring motor skill as the earlier ones. To be specific, the same individual, under ordinary circumstances, would learn to speak a foreign language as effectively and economically if he began it at the age of sixteen as if he began it at the age of nine, and possibly more so at the more advanced age. In order to determine whether this opinion or the opposite is true, we need experimental data (which, unfortunately, we do not have) from some such experiments as the following: Under thoroughly controlled, standardized laboratory conditions (to be arranged by competent experimental psychologists) representative groups of learners of various ages (say ten, twelve, fourteen, sixteen, and eighteen years) should practice, during a sufficiently long period of time, unfamiliar motor processes of the same general type as tennis playing, typewriting, etc. Exact objective measurements of the efficiency of all performances should be kept and tabulated, and the rates of learning for the groups of various ages compared. The comparative achievements and the comparative rates of learning would give us a valid answer to our problem.

Arguments in favor of suggested hypothesis. — In view of the lack of such precise objective evidence I shall make the following points in favor of the hypothesis that the years from fourteen to eighteen are as favorable for acquiring motor skill as the years from six to fourteen.

1. *Brain processes favorable.* — As far as we know, during the period from fourteen to eighteen neurone connections are being elaborated in the brain with just as much facility as during the period from six to fourteen. This is a technical point which it is not worth while to expand here, and the ordinary student need not pay any attention to it.

2. *Older students may have better methods of learning.* — As students grow older they not only continue to learn but they may learn to use better and more economical methods

of learning. Hence we should expect a youth of eighteen years to have acquired better methods of learning than a child of seven. These better methods would enable him to acquire motor skill more readily. For example, a college student might consciously apply the rule, "Be sure you 're right; then go ahead," but a child might disregard it.

3. *Skill acquired in one line may help in closely related lines.* — In some cases motor skill acquired in one process would be so similar to that required in another process taken up later that the former might help considerably in the latter. Thus, a boy who had developed skilled finger movements in piano playing from ten to eighteen years of age might profit from this in learning a touch system in typewriting at the age of eighteen.

4. *Complicating factors disregarded in ordinary observation.* — The ordinary conclusion derived from comparing adolescent learners with younger children may fail to allow for various complicating factors.

a. *Judging by nonrepresentative, extreme cases.* — The first of these is the tendency to judge by nonrepresentative, extreme cases — for example, in the case of learning to swim, to compare the lad who naturally "takes to water," and learns when young, with the studious chap who does n't care for swimming but takes it up in his college days as a means of self-preservation in case of accident. The chances are that those with natural zeal and aptitude for a sport like swimming would undertake it vigorously when young, leaving the less apt to begin later in life. The latter then appear to be slow learners, but they are really the less talented.

b. *Overlook large amount of practice in childhood.* — The second complicating factor that is commonly overlooked is the large amount of practice received during years of childhood when the line of motor activity is begun early. Thus, young swimmers will go in swimming twice a day during the summer, every day in the season, year after year, while the college student who undertakes to learn to swim in the gymnasium tank gets discouraged if he does n't master the art after one lesson a week for ten weeks. The same may be said about practice in learning to pronounce a foreign language. The instructor who compares the German pronunciation of a college German class at the end of one semester unfavorably with the German pronunciation of children who have had German for five years in the elementary school usually fails to make allowance for the much longer practice that the children have had.

Social needs and relations of subjects are determining factors. — These points would seem to justify accepting as a working hypothesis the theory that there is little or no difference in the natural facility with which motor skill is acquired at different ages from six to eighteen years. Proceeding on this basis, we would contend that instruction in swimming, tennis playing, handwriting, the pronunciation of a foreign language, etc. should be organized with little regard to the differences in ability to learn that are supposed to be characteristic of different ages. The important factors determining the arrangement for such instruction are (1) the social needs of students at different ages, (2) the relative importance of subjects, (3) their interrelations (that is, the way each subject will contribute to the learning of other subjects), (4) the number of years of practice necessary to master a given form of motor skill, (5) the chances that students who need this form of skill will remain in school long enough to get it, etc.

Learning a foreign vocabulary. *Here maintained that later years are as favorable.* — So far as high-school instruction is concerned, the most important practical question raised in the present discussion is whether the ability to learn a foreign vocabulary varies with age. It is almost universally claimed that a student must begin a language when young in order to learn it effectively and economically. In opposition to this theory, we shall maintain, as in the case of motor skill, that a foreign vocabulary can be learned just as economically at the later end of the period from six to eighteen years of age as at any other part of it. As the basis for this contention we have some very closely related evidence from experimental psychology, in the work done upon facility in memorizing at different ages.

Experiments upon memorizing at different ages give evidence. — Learning a foreign vocabulary is largely a matter of memorizing. As pointed out on page 122, in learning a foreign vocabulary a person makes automatic many thousands of new associations between foreign words, or symbols, and their meanings. The new language presents a vast new series of associations that have to be built up. The automatizing of these is pedagogically a matter of economical and effective memorizing. Hence, to get light on the problem of the best age at which to provide instruction in learning a foreign vocabulary, we need evidence showing how well students memorize at different ages.

Summaries of experiments upon memorizing. — The experimental investigations of changes with age in ability to memorize are summarized in accessible form in a number of places. One of these summaries is found in the books of G. Stanley Hall, namely, in his "Youth" (pp. 268–273) and in his "Adolescence" (Vol. II, pp. 488–492). Somewhat more critical summaries are found in Thorndike's "Elements of Child Study" (pp. 81–85) and Kirkpatrick's "Fundamentals of Child Study" (pp. 254–255 and 268–271).

Distinguish temporary learning from prolonged retention. Mental grasp. — Kirkpatrick, in his summary of the investigations in question, distinguishes between "increase in mental grasp," or temporary memory, and prolonged memory. Concerning increase in mental grasp he says:

> The experiments of Jacobs, Jastrow, Bolton, Smedley, and myself upon children of school age show that their ability to repeat or write a list of letters, figures, syllables, or familiar words immediately

after they have been heard or seen generally increases with age by about one third from the age of eight or nine to eighteen. As the reproduction is immediate, it is not so much a matter of memory proper as of mental grasp.

The cause of this increase in mental grasp with age is probably the same as that which makes it possible for us to hold in mind a long description of a route to be taken among familiar objects, while a short description of a route among unfamiliar objects cannot be kept in mind long enough, perhaps, to get started right. The same cause makes it easy for a skillful chess or checker player to see at once many more results of a move than he could when he began, or for an experienced musician to play with both hands, work the pedals, perceive the notes, and sing the words of a song all at the same time. In other words, ideas or a series of ideas, and even combinations of several series of ideas that have become definite and well established, are easily held in mind, while indefinite and newly formed ideas can be kept in consciousness only in limited numbers and with effort.

The ideas of the child are largely new, while those of the adult are oftener old or connected with old ideas; hence the adult's mental grasp is greater chiefly because of knowledge and experience. The effect of knowledge on mental grasp is well shown by a series of experiments in which first-grade children and adults reproduce ordinary letters, Greek letters, and familiar sentences. The adults have little advantage in the case of Greek letters, a great deal in ordinary letters, and are almost infinitely better in reproducing the letters making a sentence. Evidently the difference is due to greater familiarity and increased mental grasp. (**6**: 254–255)

Prolonged retention. — Concerning the changes with age in prolonged memory, or the ability to retain mental content for some time, Kirkpatrick says:

> As already shown, mental grasp or memory span, in reproducing impressions just received, increases with age in a marked degree. The increase in power to recall after an interval of time, which is more properly called memory, is much less. Jastrow found that university students remembered only 1 or 2 per cent more words after an interval of three days than high-school students five years

younger. My tests showed little difference in the reproduction, after three days, of words seen or heard and objects shown, by children from the third grade up to college students, except that the memory of the older persons was more voluntary and less ready and spontaneous. Shaw found that a story consisting of three hundred and twenty-four words, and nearly half as many distinct facts, was reproduced more than twice as fully by pupils of the ninth grade as in the lowest grade tested [namely, the third], and as well or better than by high-school or university students. He counted as correct facts expressed in other words than those given in the story. The greater difference with age in this test, compared with others, is probably because it involves associations of ideas instead of mere retention of impressions. If we take into account the slight mental grasp of the children and the length of time required for them to express what they remembered in writing, the difference in memory of impressions is almost nothing, and in memory involving associations of ideas is not very great.

The receptivity and retentiveness of the child's brain is probably as great as that of the adult. The difference in the memory of children and adults is therefore a difference in kind rather than in degree, and is caused largely by experience. Nothing that can be used as a memory test is as new for the adult as it is for the child. The adult already knows a part of what he is given to remember, or, in other words, certain brain centers have already had practice in reproducing such impressions. In the adult brain also, where many centers are already well practiced, new impressions readily run into the old channels; hence impressions are easily classified, and their centers readily awakened to activity again because of their connection with centers frequently called into action. Finally, the adult mind has more power of voluntary attention, both in receiving impressions and in trying to reproduce them by holding in mind some idea connected with them. As a consequence the spontaneous and unclassified memories of adults are not better than those of children, if they are as good, while their voluntary and systematic memories are better. (**6**: 268–271)

In learning a foreign vocabulary by either the direct or the translation method of instruction the type of memorizing involved is the voluntary and systematic kind referred to in the last sentence of the above quotation.

Evidence upon memorizing justifies postponing learning foreign vocabulary. — If we apply to the pedagogical problem concerning the best age at which to learn a foreign vocabulary the conclusions from the experimental investigations of ability to memorize at different ages, it is clear that the later years of the period from six to eighteen are just as favorable to such learning as any other years of the period. This is not merely a statement of opinion, as was our contention in connection with acquiring motor skill, but it is a conclusion suggested by the results of objective, precisely measured, expert experimentation.

Some reasons for prevalence of contrary opinion. Notice mature failures and overlook successful mature beginners. — With this fact in mind, let us consider briefly the reasons why many teachers hold to the contrary opinion that the earlier years are more favorable for learning a foreign vocabulary. In the first place, the relative difficulties that older students experience with a foreign language are commonly exaggerated, owing to the following tendencies: to judge by a few extreme cases of *poor* mature students, to disregard extreme cases of *good* mature students, and to fail to get reliable *averages* for students of different ages who are beginning a foreign language. Thus, if a language teacher in college has a mature student of twenty-five years of age who fails, the teacher commonly says it is because he began the language when too old. At the same time, however, there will be young students failing with the language but attracting no attention. Moreover, to balance *failures* of mature students who begin a foreign language, it is an easy matter to cite examples of mature beginners who have made brilliant *successes* with foreign languages. Thus, the best teacher of German and Spanish that I have ever known was an American who began the serious study of these languages after he was thirty years old. Similarly, a graduate student in the university, aged thirty-eight, began the study of French and after twenty-four weeks with a class of beginners (during which time he carried on some extra outside French reading) easily passed the reading test in French required of candidates for the degree of Doctor of Philosophy. Finally, a man of forty-five began the study of German in the university and made grades of A and B in his classes.

Mature beginners succeed in proportion to native linguistic talent.—Shall we say that these men succeeded so well with the languages because they began them when so mature? Of course not. The fact is that all of them have a natural talent for language, as shown by the fact that they all express themselves easily and fluently in English. On the other hand, many of the mature beginners who fail in studying a foreign language have little native linguistic ability, as is shown by the fact that they have little facility in expressing themselves in English.

These examples, however, are beyond the age limits with which we are concerned in our discussion in this chapter, namely, from six to eighteen. They are cited here simply because they are of the same type as the examples ordinarily used to show that mature beginners of a language are at a distinct disadvantage. In order that they may not confuse the issue, we repeat that during the period from six to eighteen years of age the experimental investigations of memorizing indicate that the later years of the period are as favorable to the systematic learning of a foreign vocabulary as are the earlier years.

Social economy also justifies postponing study of foreign language. — The above psychological discussion lends additional force to the conclusion reached upon social grounds, that the beginning of the study of a foreign language in American schools, for children of American parents, should be delayed until there is large and reasonable assurance that the particular students who begin the study will have occasion to use it as a practical tool. If this were done, a very few students would begin the study in high school, but most students who began at all would do so in college.

Delay beginning until some assurance that language will be used. — Ordinarily, nearly all high-school students are required or advised to study a foreign language, in order, *if the occasion should ever arise*, that they may be able to use it as a tool for study or research. *In what per cent of the cases is the occasion to use the language as a practical tool likely to arise?* If we ever really determined exactly what per cent of high-school students do actually use a foreign language as a tool in later life, the number would in all probability be so small that we should be justified in exactly reversing the argument stated in the first sentence of this paragraph; that is, we should say that, inasmuch as over 90 per cent of high-school students will not have occasion to use a foreign language as a practical tool in later life, we shall avoid an enormous social waste (of community money, teachers' time and energy, and students' time and energy) by making little or no provision for the study of a foreign language by most students in American high schools. Those who will use it as a practical tool in reading may begin to learn it when it becomes reasonably certain which students they are. If they are to be candidates for the degree of Doctor of Philosophy, as many of those are who use the language as a tool for studying, they can learn to read French in one year and German in two years during their college course. Moreover, learning the language at this period will obviate the waste of time ordinarily entailed in relearning the language when it has been studied early in life. That this necessity of relearning is a serious fact is shown by the large number of failures in efficiency and reading examinations in French or German by students in college who have studied the languages from two to ten years before taking the examination.

Use of foreign language as a tool for study is very infrequent. — To make the contentions of the preceding paragraph specific, let us consider 1000 students who enter high school. Of these probably 500 will not continue to graduation. Practically none of the nongraduates will have occasion to use French or German as a practical tool for further study. Of the 500 who graduate, 250 may go to college. Of these, 100 may graduate and be eligible to become candidates for the doctor's degree. But as a matter of fact, probably only 10 out of the original 1000 will ever do serious graduate study to the extent of receiving the master's degree (that is, one year after graduation from college). Probably not 5 out of the original 1000 who entered high school will become serious candidates for the doctor's degree. Of the 5, some will try to choose topics for dissertations in connection with which they will not have to use French or German. Of those who secure the degree very few will continue to do productive research work which will require a reading knowledge of a foreign language. Many of them will get positions as professors in small colleges, normal schools, or high schools, and do routine teaching the rest of their lives.

Combined psychological and social arguments justify postponing study of foreign language. — Putting together the psychological evidence concerning the facility with which a reading knowledge or the vocabulary of a language is acquired at different ages, and the facts concerning the enormous social waste that is entailed by requiring or advising students to begin the study of foreign languages early, we feel justified in maintaining that in most cases the study of a foreign language should be begun in later adolescence (from eighteen to twenty-two years of age), when the few students who will use the language begin to arrange their elections of studies with definite reference to a practical goal in connection with which they will use them.

Changes with age in reasoning processes. *Maintained here that elementary children use same processes as adolescents.*— When we take up a consideration of the reasoning processes of students at different ages, we again confront a condition in which the dogmas of ordinary observers are controverted by scientific evidence. The ordinary opinion, often found expressed in pedagogical books, is that young children do not reason as older persons do, and that some magic change takes place at the beginning of adolescence which results in the appearance or development of the reasoning powers. As opposed to this opinion, scientific psychology, which is based upon carefully conducted, precise, experimental investigations, shows that children solve problems and acquire and use abstract and general ideas by the same general mental processes as adults use. In other words, children carry on reflective, analytical, abstract, generalized, reasoned thinking in the same way as adults, although not as extensively as adults who are engaged in certain specialized professional and scientific pursuits.

Reasoning abilities of children demonstrated by Bonser.— The abilities of children in the intermediate grades to solve problems and do reflective thinking of various types were thoroughly investigated by F. G. Bonser and the results reported in his monograph entitled "The Reasoning Abilities of Children in the Fourth, Fifth, and Sixth School Grades." His experiments included, among other tests, the working of mathematical problems of the following types:

I. *A.* 1. If $\frac{3}{4}$ of a gallon of oil costs 9 cents, what will 7 gallons cost?

2. John sold 4 sheep for $5 each. He kept $\frac{1}{2}$ of the money and with the other $\frac{1}{2}$ he bought lambs at $2 each. How many did he buy?

3. A pint of water weighs a pound. What does a gallon weigh?

I. *B.* 1. A man whose salary is $20 a week spends $14 a week. In how many weeks can he save $300?

2. How many pencils can you buy for 50 cents at the rate of 2 for 5 cents?

3. A man bought land for $100. He sold it for $120, gaining $5 an acre. How many acres were there?

II. *A.* 1. 132 plus what number equals 36?

2. If John had 15 cents more than he spent to-day, he would have 40 cents. How much did he spend to-day?

3. What number minus 7 equals 23?

II. *B.* 1. What number subtracted 12 times from 30 will leave a remainder of 6?

2. If a train travels half a mile in a minute, what is its rate per hour?

3. What number minus 16 equals 20?

Concerning the kind of mental processes involved in these problems Bonser says:

> Tests I and II, the problems in arithmetic, test the mathematical judgment, in general that form of deductive reasoning most closely resembling the syllogistic movement of formal logic. The steps here involved are three: First, the analysis of the situation, by which the essential features of the problem are conceived and abstracted; second, the recall of an appropriate principle to be applied to the abstracted problem — a search among various principles which may suggest themselves for the right one; and third (involved in the second), the inference, the recognition of identity between the known principle and the new situation. While this process goes on as implicit, explicitly there are made the concrete applications in the resolution of the problems. Clearly these are examples of deductive reasoning of the usual scientific type, involving data, principles, and inferences. The only element omitted is that of verification, which, by the nature of the tests, cannot here be brought out. (**2**: 14)

As would be expected by anyone familiar with the children of the grades tested, the problems used in the tests were solved successfully by children in all of the grades, although there was improvement through the grades. Some of the best achievements were made, however, by some of the children in the fourth, or lowest, grade tested. Thus, 5 per cent of the boys in grade 4A reached or exceeded the ability reached by the highest 25 per cent of all the boys in the test.

These data show by objective evidence that children do the same type of reflective thinking and problem-solving as adults do. For an extended defense of this point of view see the article by Professor John Dewey entitled "Reasoning in Early Childhood," in the *Teachers College Record*, January, 1914 (**4** : 9–15).

Arguments for contrary opinion refuted. Mistakes in reasoning not evidence of lack of reasoning. — In order to make the whole situation concerning reasoning abilities at different ages somewhat clearer, we shall consider some of the points commonly made in connection with the ordinary opinion that young children do not reason. One reason why persons hold this opinion is because children make mistakes in their reasoning. These mistakes, however, are not evidence of lack of reasoning. Even the best reasoners make mistakes, and some of the errors made by large numbers of adults appear as ludicrous to those who are better informed as do the mistakes of children. Thus, in the seventeenth century there was common belief in the efficacy of a sympathetic powder or salve which was supposed to cure a wound through being rubbed on the weapon instead of on the wound. As a matter of fact, those who used the powder or salve often found that their wounds got well; but that their reasoning in attributing the cure to the salve or powder was fallacious becomes evident on reading the directions accompanying it. These were, "Rub the salve on the weapon and keep the wound clean and cool." The medical practices of the past were full of such errors, yet some of the physicians who believed in them were well-educated men and skilled reasoners. Hence, the fact that children make mistakes in reasoning is not proof that they cannot reason. It simply shows, as in the case of adults, that they have insufficient information or have failed to discover the essential element in the problem which they are considering.

Reasoning of children confined to problems within their grasp. — Another reason for underestimating the reasoning activities of children is a survival from the educational practices that prevailed during the period of religious dominance in elementary education, especially before the nineteenth century. During this period the material of instruction consisted largely of religious discussions, a long catechism being considered the most important. Since children could not understand or reason with the theological abstractions contained in the catechism, it was assumed that they could not reason at all. Rousseau (in 1762) made the proper psychological correction to this opinion when he asserted that, although children could not reason about the abstractions of theology, they could reason effectively about matters within the range of their experience and understanding.

Children use symbolic images in reasoning. — Some authorities, instead of abiding by the objective evidence of the reasoning done by children (such as Bonser's study), endeavor to show that children's reasoning is of a different type from that of adults, by saying that children use concrete images as the mental stuff for their thinking, while adults in logical reasoning use symbols, words, etc. without attendant concrete images. For all practical purposes this is simply a quibble, since the problems solved and the objective results produced by children are of exactly the same types as those of adults, and statements concerning the nature of their mental processes must be indirect inferences or guesses. Moreover, it is doubtful whether the asserted difference between the mental stuff used in the reasoning of children and that used by ordinary adults can be established in the way mentioned, that is, in terms of the presence and absence of concrete imagery. In the first place, children in school begin very early to use symbols in such a way that the concrete imagery is relatively unimportant. For example, consider problems II, *B*, 1 and 3 in Bonser's test printed above on page 327. In solving these problems the essential thinking by the children may be and must be carried on, to a very large extent, in terms of mathematical symbols and abstract terms — in fact, to just as large an extent as would be the case with an ordinary adult who solved the same problems.

Adults may have concrete imagery in logical reasoning. — Moreover, an adult may be working with a problem in connection with which abstract symbols and generalized ideas would seem to be the important thought-stuff, and yet have concrete images of particular situations constantly coming to mind. For example, I was recently asked by a normal-school president to examine and criticize his two-year course of study for high-school graduates. It happened that I had just made a study of normal-school catalogues and had tabulated and codified the requirements and practices in twenty-five representative institutions. On this basis I had drawn up a statement of what seemed to me to be the essential elements in a two-year normal-school course, and I had this clearly in mind as the logical basis for criticizing the course submitted to me for evaluation. On the other hand, I had spent five years as a teacher in a normal school in Ohio. In fulfilling the normal-school president's request I found that instead of thinking purely in terms of the generalized normal-school investigation that I had just made, I was continually having in mind concrete images of courses of study, faculty meetings, committee meetings, etc. at the Ohio normal school, where we had discussed the same general problems as applied to a specific situation. In other words, the essential ideas and meanings in my reasoning about normal-school administration were the abstract tabulations and generalized statements reached in my general survey, but running along with these in my thinking were the unnecessary and relatively useless pictures of former colleagues sitting around tables and desks. Thus it would appear that even adults who are carrying on a highly generalized type of reflective thinking or reasoning *may* have more or less concrete imagery accompanying it. Hence we do not find that the logical reasoning of ordinary adults necessarily differs from that of children by the absence of concrete imagery.

Adolescence brings no new intellectual processes. — Finally, it is sometimes assumed that there is some great change at adolescence in the type of intellectual processes carried on. It is argued that, since there are such profound physical, instinctive, and emotional changes associated with the maturing of the sex functions, there must be similar innovations in the intellectual life. There is, however, no scientific evidence to indicate that any such change in the general character of the intellectual processes does take place. As students grow from the primary grades to high-school graduation no new types of intellectual processes appear and no sudden changes take place in the general character of any of the types that are present. Sensory discrimination, or sense perception, is present all the time and increases gradually in efficiency. Images are present at all ages from six to eighteen. In the prolonged thinking of any individual, at any age, concerning almost any new topic, the concrete images tend to become subordinated to symbolic images or imaged symbols (usually words) and feelings of meaning as the thinker becomes better informed about the topic and his ideas about it become more general and abstract.

Adolescence does bring new social problems and economic responsibilities. — Similarly, reasoning is going on at all ages of school experience. Adolescence commonly brings with it larger social interests and larger economic responsibilities, which provide opportunities for thinking about many larger problems than those which presented themselves during the years from six to fourteen. But these larger problems at adolescence are thought out by the same types of mental processes as children have been using in their studies and games and employments during the period from six to fourteen. Hence, as Dewey says, in reflective thinking

> the only way to achieve traits of carefulness, thoroughness, and continuity (traits that are, as we have seen, the elements of the "logical") is by exercising these traits from the beginning and by seeing to it that conditions call for their exercise. (**3** : 65)

Same general principles of reflective thinking apply at all ages. — In view of these facts we may conclude that the general principles concerning training in reflective thinking which were discussed in Chapter IX apply at all stages of schooling, from the kindergarten to college graduation. Hence adolescent training calls for no *peculiar* principles of instruction in connection with reasoning, but simply requires an intelligent application of these *general* principles.

Same point of view applied to training in enjoyment and expression. — In taking up the two remaining types of learning (namely, acquiring habits of enjoyment, and skill in expression) we shall maintain the same general position as we have in the cases of motor skill, association of symbols and meanings, and reflective thinking; that is, the later years of the school period (from fourteen to eighteen) are characterized by the same general methods of developing habits of enjoyment and expression as are the earlier years (from six to fourteen), although the content of the experiences which play a part in the enjoyment or expression may be different and the directions which the interests of the students take may vary.

Training in enjoyment based on persistent instincts and emotions. — At the basis of many of the forms of enjoyment are found certain fundamental instinctive and emotional tendencies that are present in all of the years of the school period. The instinctive enjoyment of rhythm is one of the best examples. It plays a prominent part in the enjoyment of music, poetry, and dancing at all ages. Similarly, the interest in action, from which a large part of the contemplative enjoyment in watching games and dramatic performances is derived, is based on ingrained instinctive emotional tendencies which are probably as strong during the period from fourteen to eighteen as from six to fourteen. Certainly thousands of observers during the older period will be held spellbound by the action in athletic contests and in the theater in the same way as children are. It would be possible to go through the whole gamut of forms of enjoyment discussed in Chapter X and show in the same way that the fundamental basis in most young persons is the same at all ages, namely, certain deep-seated, persistent, instinctive emotional tendencies. It would be difficult to find a single instinct that is ever fundamental in the enjoyment of leisure and which is also *transitory* in character, that is, dies out in the later part of the school age although present in the earlier part. For an elaborate defense of this position see Thorndike's criticism of James's famous statement to the contrary (**8** Vol. I : 260–269). On the other hand, we have appearing during the school period the finest example of a *delayed* instinct to be found, namely, the sex instinct. This instinct must be added during the adolescent period as a fundamental factor in the enjoyment of leisure time, and must be given serious consideration in connection with parties, dancing, reading, and possibly other lines of enjoyment. The same general principles of training for enjoyment, however, apply to the period which includes the sex instinct as apply in the earlier periods ; namely, those described in Chapter X.

Expression. — Practically the same points as were made above in the discussion of training for enjoyment at different ages apply to training in expression. Hence they need not be repeated. In general, effective training in expression is secured at all stages in the school process under the same general conditions as were outlined in Chapter XI; namely, (1) a real audience situation, (2) the student with interesting new content which he desires to communicate, (3) the careful organization of the same as a product of and aid to clear thinking, and (4) the endeavor to get the point of view of the audience, in order to make the presentation clear, interesting, and impressive. As in the case of training for enjoyment, the development of the sex instinct adds, during the adolescent period, to the list of instinctive tendencies of students which the teacher must consider. It brings with it certain secondary characteristics, such as shyness or bashfulness and the opposing desire to show off, which are very important factors in the training in expression in mixed classes.

Conclusion of discussion of influence of age on learning. — In general we can describe human beings from six to eighteen years of age as being very similar as far as their fundamental methods of learning are concerned. In the case of acquiring motor skill, the older students learn with approximately the same facility and by almost the same methods as the younger ones when attacking forms of skill that are equally novel to all groups. At all ages the principles concerning the part played by a correct start, imitation, verbal directions within the understanding of the learner, correct practice with zeal and concentration of attention, etc. apply as described in Chapter VI. In intellectual learning we find all the basic processes active at all ages (from six to eighteen); namely, the processes of sensory discrimination and sense perception, concrete imagination, symbolic representative thinking in terms of words and other symbols, analysis, abstraction, the reflective solution of problems, reasoning. Hence, at all ages students should be given training in careful, purposive, controlled thinking as well as in the building up of systems of associations. Similarly, in acquiring habits of enjoyment and skill in expression the same general principles apply at all ages. During adolescence the sex instinct enters as an additional conditioning factor to be taken into consideration in the application of the general principles.

Throughout this chapter and the preceding ones, on expression and on self-activity and apperception, we have had frequent occasion to emphasize the importance of adapting instruction to the interests of students, and have noted that, while these interests are based upon fundamental persistent instincts at all ages, their specific direction or content varies greatly with the experiences of the students. The importance of these instinctive interests as furnishing the chief basis for getting students to apply themselves so as to learn effectively and economically will be discussed in the next chapter.

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Exercises. — See pp. E 175–E 176 of the *Exercises.*

CHAPTER XIV

INTERESTS, THE BASIS OF ECONOMY IN LEARNING

Main points of the chapter. — 1. Difficult and worthy achievements in life are based on intense interests.

2. Similarly, effective endeavor and economy in learning is best secured in school by utilizing students' active interests.

3. Closely related to interest is attention, which may be subdivided as follows:

a. Spontaneous attention, which is either
  (1) Instinctive or
  (2) Habitual.
b. Forced attention.

4. Spontaneous attention is much more effective than forced attention as the basis of economical learning.

5. The following instincts are discussed as the basis of spontaneous instinctive attention in school:

a. Fear of physical pain, fear of sarcasm and ridicule, and individual emulation, which have been or are being discarded.

b. Mental activity, curiosity, physical activity, manipulation, communication, and coöperation, which are coming to be used more extensively.

6. Habitual interests or habitual tendencies to give attention are formed by students as they progress through school, and teachers should build upon these.

7. To utilize the natural and acquired interests of students effectively, teachers in high schools should familiarize themselves with the interests of adolescent boys and girls.

Intensive application necessary for economical learning. — The problem of this chapter is the one of getting pupils to apply themselves so that they will carry on effectively and economically the processes of learning described in the preceding chapters. The relation of this problem to the previous discussions may be outlined briefly as follows: As the first point to be considered we took up (in Chapter II) a discussion of the broadening tendencies found in high-school instruction at the present time, and defined the ultimate purposes of such instruction as social efficiency (economic, domestic, and civic), good will, and harmless enjoyment. We then showed (in Chapter III) that the modern school which is organized to attain these aims must apply principles of business management in order to avoid the enormous waste that would otherwise occur in such a complicated social institution. The subject matter to be used was next considered, as its selection and arrangement affects the individual teacher, and emphasis was placed upon the adaptation to varying social needs and to the interests and capacities of the students. In the next nine chapters (V to XIII) we considered at length the processes by which students learn, since the direction of the learning process is one of the teacher's chief duties. We discussed the methods by which each type of learning is carried on most effectively and economically, as well as the influence of certain general factors, including the increase in age of the students. Now, having gained an idea of what the school should aim to accomplish, its general principles of economical management, the subject matter it should use, and the types of learning it must direct, we confront the problem of securing intensive application by the students in order that the learning processes may be carried on effectively and economically.

Intense effort best secured by utilizing student's active interests. — The best basis for economy and effectiveness in learning is concentration of attention by the learner upon the process or material to be mastered. Such concentration of attention is best secured through the learner's active interests. Hence the teacher should be skilled in so arranging educative situations that the students will lay hold vigorously upon the experiences provided and will reach out after more. This is what is meant by having instruction appeal to the student's interests. It conceives of interests as dynamic active tendencies in human beings, which the school can take advantage of and so direct that the energies of the students will be spent in mastering materials and processes that are educative.

A business proposition, not a matter of sentiment. — This way of regarding the utilization of student's present interests as an aid in instruction is purely utilitarian and cold-blooded in character. There is nothing sentimental about it, any more than it would be considered a matter of sentiment for a traveling salesman to try to sell an improved adding machine to a business man by appealing to the man's interest in securing speed, economy, and accuracy in his bookkeeping. In the selling of most kinds of goods the salesman can assume, on the part of the prospective buyer, the existence of certain active interests which are an essential part of the latter's business activity. The salesman builds upon these in the same way that the teacher ought to build upon the active interests of students which are the essential elements in their lives. When the school is adapted to social needs, it is endeavoring to accomplish certain fundamental human purposes which are paralleled by the students' interests. This is especially true during the adolescent period. It is simply a matter of common business sense to approach the purposes to be attained through their corresponding interests, in the same way that the skilled salesman approaches his prospective customer through the latter's interests.

Opposed by advocates of drudgery in school. — The view of instruction which has just been presented regards the school as preparing in very definite ways for the manifold activities of life in which most normal human beings are vitally interested. With such a general point of view it is a simple matter to so organize instruction as to utilize the natural energies of students in getting the activities of the school carried on. The opposite view of instruction, which considers its materials and processes to be essentially and necessarily distasteful to students, prevailed in secondary instruction for a long time and still has some ardent advocates, especially in schools which maintain the old classical curriculum with little modification. This view may be designated as the drudgery view of instruction. According to this view Latin is a splendid instrument of instruction, because in teaching it we can so easily assign to students definite distasteful tasks which will develop their will power and thus prepare them to attack the distasteful duties of life.

Achievements in life based on intense interests, not on drudgery. — The drudgery view of learning is certainly fallacious if we regard the school (as we have been doing in this book) as a place that prepares in quite specific ways for the activities of life, because, to do this economically, it is necessary to work with and not against the active interests of students. Moreover, it is probably a more valid view of life and achievement in general to say that persons who accomplish great things in life are those who are actuated or driven by intense, abiding *interests*. This is true of most of the great leaders in science, literature, politics, morals, and religion. As compared with these, the number of persons is relatively small who have accomplished things by saying, "Here are great unpleasant duties. I must perform them in spite of the fact that I hate to do it. The fundamental activities of my life are certainly uninteresting; they make no appeal to me; but I must find some way to drive myself to my work." Moreover, the same contrast would probably be true of ordinary people who try to lead worthy lives; most of them do worthy deeds because they have strong, abiding, specific interests in the activities represented, not because they are driven by the sense of duty to do distasteful tasks. Hence the preparation for a life of useful service should be made by directing the active present interests of students in such a way that the worthy interests of life grow out of them.

Difficult undertakings often the most interesting. — A corollary of the theory which regards intense interests as the basis of achievement is the statement that intense interest may be manifested in accomplishing very difficult things. The most extreme examples of this fact are those in which the difficult activity is interesting largely because of its difficulty. The best illustrations from school life are found in the interest with which some students attack difficult exercises in geometry. An example from ordinary life is mountain climbing. This is illustrated not only by the activities of professional climbers, who go to the ends of the earth to scale the highest peaks, but also by some of the climbing undertaken in the Alps by amateurs simply in order to climb difficult mountains.

Interest in the final end lends interest to intermediate steps. — Very commonly an intense interest is maintained in achieving some end regardless of the difficulties which beset the path, and the interest in the final end develops an interest in mastering the intermediate difficulties. Among the best examples are the careers of great singers and actors and actresses. These have been well illustrated in the many recent accounts of the long and varied training which great singers must go through, including not only vocal training proper but also linguistic training and severe physical regimen, to develop a powerful physique. In such cases the intense interest in the final achievement impels the singer to practice the intermediate processes, which sometimes, as a result, become very interesting in themselves. To be sure, specific efforts of the will are often necessary in starting the learner upon a period of practice, but such efforts are commonly not actuated by an abstract sense of duty, but by the interest in the final goal, to which the relation of the intermediate steps is clearly perceived. In view of this discussion we may assume that an emphasis upon interests as the basis of effective and economical learning in the school is perfectly consistent with prolonged, intense application by the students in mastering difficult assignments.

Part played by interest in learning shown in preceding chapters. — The point of view which regards present interests as the basis for effort and achievement in instruction has been assumed throughout the preceding chapters. Thus, in Chapter II (p. 22) the development of abiding, many-sided interests was named as one of the important proximate aims of instruction. In Chapter IV (p. 80) the adaptation of subject matter to the present interests of students was set forth as one of the chief factors in carrying out the psychological instead of the logical point of view in organizing subject matter. In Chapter X (p. 259) and Chapter XI (p. 278) this same point was given detailed application to training in habits of enjoyment and expression. In the chapter on practice and drill (p. 149) the most convincing fact which we possess concerning the value of concentration of attention based on interest was stated in connection with Book's experiments on acquiring skill in typewriting. This fact was that improvement in speed, as shown by actual measurements, was greatest when interest and concentration of attention were greatest. Periods of dead mechanical practice were characterized by little improvement in speed. Moreover, it was clear in Book's study that the concentration of attention which was effective was not secured by a dead heave of the will, but was based upon spontaneous interest.

Interest and attention; spontaneous and forced attention; a working classification. — The last statement in the preceding paragraph furnishes the point of departure for an analysis of the methods of securing interest and concentrated attention, for attention may be characterized as either (1) spontaneous or (2) forced. *Spontaneous* attention seems to come of itself, either because the individual is impelled from within by active interests or because of the attractiveness of some object which appeals to some tendency in the individual. *Forced* attention, on the other hand, seems to be especially constructed or manufactured by the individual, either in response to his own idea that he must attend or in response to a demand from some other person. It is always difficult to get satisfactory descriptive terms to designate kinds of attention, but for the purposes of our pedagogical discussions the use of the terms *spontaneous* and *forced* as defined above will be sufficiently clear.

Spontaneous attention more effective than forced attention. — As pointed out in our discussion of Book's experiments on learning to use the typewriter (see p. 152), spontaneous attention is more effective than forced attention, because the former is usually undivided and hence is more constant and concentrated. On the other hand, forced attention (at least in the beginning of the attentive act) is usually divided, for not only is the learner endeavoring to give attention to the matter in hand, but he also has in mind the fact that he must give attention, and he has to keep thinking that he must check himself from failing to attend to the matter in hand. Moreover, he is at the same time often impelled or attracted by some other object of attention which appeals to his interests. In such a situation, attention to the matter to which he is endeavoring to give forced attention is likely to be quite fluctuating; hence, not concentrated; hence, not very effective. As an example of such a situation let the student call to mind his own efforts to study for an examination when a conversation in which he is interested is being carried on across the table from him and he realizes that he has only twenty minutes left in which to get ready for the examination. Or call to mind efforts to study after returning from a dance, with the mind full of alluring melodies and memories, or after laying down an unfinished and exciting book. It takes no fine psychological measurements to show that the progress made during an hour of such divided and forced attention is often not as great as that made during fifteen minutes of concentrated, undivided, spontaneous attention to the lesson in question. In school work it is obvious that the substitution of such spontaneous, undivided attention for the forced and divided attention which is often found there would mean much more effective and economical learning.

Two kinds of spontaneous attention, the instinctive and the habitual. — Spontaneous attention, which it is so desirable to secure, may be based upon interests or active tendencies which are either instinctive or habitual (that is, acquired); hence we may speak of *instinctive* spontaneous attention and *habitual* spontaneous attention. If now we tabulate our descriptive terms for the various kinds of attention, they appear as follows:

1. Spontaneous attention
    - *a.* Instinctive
    - *b.* Habitual
2. Forced attention

Examples of instinctive spontaneous attention are the following: attention to moving objects, to loud noises, to rhythmic noises, to living animals by children, to members of the opposite sex during adolescence, to contests of various sorts, to stories of adventure, romance, etc. In general, there would be examples of instinctive spontaneous attention corresponding to every one of the long list of human instincts to which reference will be made later on. Examples of habitual spontaneous attention are the following: attention to the block signals by the locomotive engineer, to the barometer by the navigator, to the stock reports by the broker, to the rocks of a region by the geologist, etc. Many cases of spontaneous attention have a definite, instinctive basis, which has become specialized by habit in certain directions. Thus, the instinctive spontaneous attention which the lover of sports gives to contests becomes specialized by habit in the tendency to give rapt attention to the sporting page of the newspaper. The instinctive spontaneous attention which some speculators and financiers give to business gambling for gain becomes specialized by habit in the form of attention to the tape of the ticker upon which appear the stock reports. We shall take up each type of spontaneous attention for detailed consideration in relation to instruction, considering instinctive spontaneous attention first.

Instinctive spontaneous attention. Instincts the basis of human behavior. — The first point to consider in connection with instinctive spontaneous attention is the large part played by instincts in determining human tendencies and conduct. It is sometimes assumed that animals are guided by instincts and man is guided entirely by reason. As a matter of fact, man has more instincts than most animals, and the instincts of any particular individual are largely the basis of his character and his active interests. To secure an appreciation of this fact the student should read the chapter on instincts in William James's "Principles of Psychology" (Vol. II, pp. 383–441) and the first part of MacCunn's "Making of Character" (1913) (pp. 1–68). Both of these books have a very attractive style, and the discussions referred to throw an interesting light on human nature generally, apart from all pedagogical considerations. For a more accessible and equally interesting account of instincts, read J. R. Angell's "Psychology" (1908) (pp. 339–362).

Three questions in evaluating each instinct. — In taking up the pedagogical consideration of instincts as the basis of instinctive spontaneous attention, we may note three questions that should be kept in mind in determining the desirability of utilizing any given instinct in school as a means of securing interest; namely,

1. What part does the instinct play in social life?

2. Is it effective when utilized as a basis of attention and interest in instruction?

3. Are the present and ultimate educational results of utilizing it satisfactory?

Illustrated by application to instinct of emulation. — To illustrate the application of these questions, let us consider the use of the instinct of emulation in instruction from the standpoint of each question.

1. *Emulation an important cause of social striving.* — Emulation, or rivalry, is one of the most impelling motives in social life. In fact, Veblen, in his "Theory of the Leisure Class," maintains that "pecuniary emulation" (that is, the desire to possess more wealth or position or power than someone else) is at the basis of most social striving and many phases of social organization. He gives examples which vary from the savage who can show the obvious trophies of the chase as evidence of his power and wealth to the American millionaire whose unused mansion on Fifth Avenue or Riverside Drive in New York, and whose jewel-bedecked wife in the golden horseshoe at the opera, serve the same purpose by being tangible evidence that he has so much money that he can afford to spend it in perfectly useless or unnecessary ways. Such persons, and in a small way many others, are not striving for necessities or even for luxuries; they are simply striving to get *more*. At first they strive to get more than some persons and as much as certain others in order to be considered in the class with the latter. Having attained this point they are not satisfied, but continue to strive to secure more than their present equals in wealth or power or position, in order to have as much as some other individual or group higher up in the scale of quantity. Thus the striving is always going on, bringing with it many material improvements in life and at the same time producing much unhappiness, but leaving no doubt that emulation is one of the most influential causes in social endeavor.

2. *Emulation has been effectively used in schools.* — When we regard emulation from the standpoint of our second

question, namely, its effectiveness when used in instruction, it becomes evident that it can be made just as influential in school as it is in social life at large. If prizes, rewards, honors, and position are held up for competition, the striving of students to attain them commonly becomes intense and vigorous. If the conditions of the competition are so arranged as to give a chance to students of all degrees of ability, the stimulus affects large numbers of the students. The large possibilities of using emulation as a motive were most thoroughly worked out by the Jesuits, whose secondary Latin schools were the most efficient in Europe for over two hundred years before 1773. There were many factors contributing to cause this efficiency, one of them being the organized appeal to emulation. Their scheme is described in the following quotation from Quick's "Educational Reformers."

> One of the leading peculiarities of the Jesuits' system was the pains they took to foster emulation, "the whetstone of talent, the spur of industry." For this purpose all the boys in the lower part of the school were arranged in pairs, each pair being rivals (*aemuli*) to one another. Every boy was to be constantly on the watch to catch his rival tripping, and was immediately to correct him. Besides this individual rivalry, every class was divided into two hostile camps, called Rome and Carthage, which had frequent pitched battles of questions on set subjects. These were the "concertations," in which the boys sometimes had to put questions to the opposite camp, sometimes to expose erroneous answers when the questions were asked by the master. (**8** : 42)

Further evidence concerning the effectiveness of an appeal to emulation can be cited by anyone who is familiar with the results in high schools where students are stimulated to study for gold and silver medals, for first place in the class, etc. To be sure, the possibility of securing these honors stimulates only a few, but the effect upon these is evidence that a competitive system that would stimulate all would be effective in increasing the general interest in and attention to studies.

3. *Are the total effects of using individual emulation unsatisfactory?* — When we come to consider the total influence of appeals to emulation, we find ourselves in a dilemma. Many idealistic educators disapprove entirely of the use of emulation and rivalry in schools, because, they say, this practice merely increases in each pupil the tendency to scramble for more wealth or position or power. Not only in social life but also in school, they say, it tends to develop unhappiness, hard feelings, and deceit.

Human play is naturally strongly competitive. — On the other hand, if we watch children and adults at play, we find emulation such a large factor that we might conclude that it is one of the greatest contributors to human happiness.

Rivalry in social life may be directed to worthy ends. — Further light is thrown on our dilemma by examples from social life where competition, or rivalry, is used in the pursuit of some worthy end, such as raising funds for the Red Cross. In this case, the harder persons or teams compete, the harder they are working for a desirable social outcome.

Emulation being directed in school to secure beneficial results. — Possibly the answer to our dilemma would be that emulation is not in itself a pernicious tendency, but, instead, is one of the most useful of human instincts in bringing about self-improvement and social improvement. The problem of directing it in social life so that people shall compete in socially helpful ways is being solved by democratic governments which are restricting the opportunities for individuals to acquire enormous fortunes and power and are interesting efficient competitive persons in public services. In schools the problem of utilizing rivalry is being solved by setting up standard scores or achievements for individuals to attain and by instituting group competitions.[1]

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[1] The point of view expressed here (in 1919) reverses that of earlier printings of the text. The change is due to wider observations (1) of human play, and (2) of competitive American activities during the war.

Thus we have considered the instinct of emulation from the three points of view outlined above; namely,

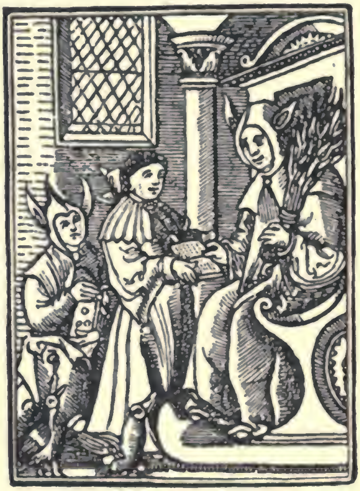
1. The part which it plays in social life.
2. Its effectiveness as used in school.
3. The value of the educational results of using it. Students should keep these three points in mind and apply them in evaluating all human instincts that may be used as the basis of attention and interest in instruction.

Important instincts used as basis of attention and interest. — We shall now take up a few of the instincts which have been used in practical ways in school to secure attention, in the order of their emphasis historically.

Fear of physical pain generally used until 1800. — It is hard to realize that in Western Europe for hundreds of years the principal means of getting students to study their lessons was fear of physical punishment; but this was the case. There is plenty of evidence in the pictures of old-time schools, in the appeals to abolish the practice which were made by such famous writers as Erasmus (1466–1536), Comenius (1592–1670), Ascham (1515–1568), and Mulcaster (1530–1611), and in the records of the number of whippings given by schoolmasters. The picture on page 349, in which a large bunch of switches is held ready in the master's hand, is typical. The switches were held in such a convenient position, not because the boys were likely to be unruly or insubordinate, but in order that the teacher might give a blow for each mistake as soon as the pupil made it while reciting.

Apart from the fact that for humanitarian reasons such punishment would not be tolerated at the present time, it would not be used because it is obviously ineffective. Instead of securing spontaneous attention, at the best it secures forced, divided attention under conditions that are very unfavorable to mental progress. For these reasons the use of the instinctive fear of physical pain as a stimulus to attention was generally discarded after the beginning of the nineteenth century.

Fear of sarcasm and ridicule. — Somewhat akin to the appeal based on the fear of physical pain is that based on the instinctive fear of sarcasm and ridicule. This form of stimulus is still used by many teachers, who regard it as an effective instrument. Such teachers practice the use of sarcasm and ridicule as an art, and develop a vocabulary of stinging terms and expressions calculated to make the laziest student apply himself in order to avoid a repetition of the ridicule. It is true that such methods are often effective in securing attention and effort on the part of the student, but attention secured in this way is likely to be forced and divided, and hence relatively ineffective as compared with spontaneous attention. If some means of arousing the latter can be devised, it would be better to omit sarcasm and ridicule. Moreover, the unhappiness which these cause most students to suffer and the unfriendly relations which they tend to establish between teacher and students furnish additional reasons for avoiding their use under ordinary circumstances. Certain mild forms of good-humored ridicule, in which the lazy or careless student becomes the object, for the moment, of mild, friendly bantering by the teacher, would be the exceptions to the general rule of eliminating ridicule as a stimulus to attention.



A FRENCH SCHOOL ABOUT 1628

Note the convenient bunch of switches, ready to give a blow for each mistake. After Cubberly

Emulation used by the Jesuits as described above. — The transition from the use of the fear of physical pain to the use of emulation represents a definite historical advance and was so regarded by the two large systems that used emulation extensively; namely, that of the Jesuits (1540), discussed above, and the Lancasterian monitorial system, which was adopted extensively in the large cities in the United States from 1805 to 1830. This system used an elaborate scheme of medals, tickets, and prizes, of which there are still some survivals in our schools. In view of the long evaluation of the use of emulation given above (pp. 345–348), nothing further need be said here concerning it.

Higher instinctive appeals utilized recently. — We now come to a long list of instincts which began to be considered as the basis of attention during the educational reforms that developed in the later eighteenth and in the nineteenth century under the stimulus of Rousseau's *Émile*, which was published in 1762. The list includes mental activity, curiosity, the collecting instinct, the instinct of physical activity, manipulation, communication, and coöperation. Some of these are more easily and profitably used in the elementary school than in high school.

Mental activity. *Normal human beings cannot keep from thinking.* — By the instinct of mental activity is meant the natural tendency of human beings to be actively and spontaneously thinking whenever they are awake. Such spontaneous thinking varies from the revery of the daydreamer to the scintillating ideas of the wit or the intense, suggestive, and critical reasoning of the scholar. In all of these cases the thinking may go on with no special practical purpose in view. The thinkers think because they can't help it; they are driven by instinct. You may imagine the daydreamer and the wit and the scholar all reclining lazily on the ocean beach or in the comfortable chairs of a vacation resort in summer, with nothing to do except loaf — and the dreamer dreams, the wit scintillates, and the scholar goes on reflecting just the same.

Opportunity for active thinking should be provided. — This fact, that much intense active thinking is done as the result of the strong instinctive tendency which many persons possess, is sometimes overlooked by writers who insist that students must always feel some practical need or motive for their studies. Studies should appeal to practical interests in general, but the instinct of mental activity, as well as many of the other instincts, will often keep many students actively at work physically and mentally if the school will simply open up outlets for this instinctive activity.

My own experience as a youth is typical. In the grammar grades of the ordinary elementary school which I attended, no special outlets for instinctive mental activity were opened up. Hence, like many boys, I read many books of adventure. Our family had three public-library cards. Making a trip down town on Saturday, I could get three books of fiction, such as "Ragged Dick," "Frank on the Gunboat," etc. These were read through by Sunday evening. Then recourse was had to five-cent novels. These could be bought second-hand, two for a nickel. By trading with other boys, I could piece out the week with reading matter until the next trip to the library. Instead of completing the eighth grade in the public elementary school, I transferred to a private manual-training high school which maintained an eighth grade. Here the methods of instruction were entirely different. Every lesson opened up some outlet for further thought or reading or collecting. Instead of securing books of fiction from the library, books on history, physiography, botany, etc. were taken out. These were read and studied after school and in the evening, not as required work but simply as outlets for mental activity. Moreover, the change was not due to a disappearance of the interest in stories of adventure, for I have always continued to read "Sherlock Holmes" and similar stories with intense interest; but the mental energy which went into this line of activity was easily diverted to another when opportunity was offered.

Most students have favorite lines of mental activity.— Some students exhibit little preference in the choice of the direction which their thinking will take; they think just as spontaneously along historical lines as along mathematical or mechanical lines. Most students, however, exhibit definite preferences, and these must be considered by the instructor. In probably half of the students to be found in high school the instinct of mental activity is sufficiently strong to result spontaneously in serious study along one or two lines, provided the way to these lines is opened up. The preferred lines might be historical and literary, or mathematical and scientific, or scientific and mechanical, etc.

Curiosity; either alert contemplation or mental striving.— The instinct of curiosity is a special phase of the instinct of mental activity. It is the phase represented by the tendency to be interested in the novel aspects or the unmastered aspects of the situation. Sometimes it involves merely alert contemplation, but often it is characterized by intense mental striving. In either case it is a most useful instinct for securing instinctive spontaneous attention.

Easily aroused.— Examples of the use in high school of curiosity in the form of alert contemplation are found in all subjects in the use of novel examples within the general range of the students' experience. Any new concrete or specific instance or incident, if presented with skill, is almost certain to challenge curiosity in the form of alert contemplation. Any number of examples can easily be given by students, especially from the subject matter of science. Curiosity is seldom aroused in high-school students, however, by general and abstract statements unless these evidently present a new aspect of familiar experiences or familiar general ideas. An example of such a statement would be that water often runs uphill. Another would be that all men are not created equal even though it is so stated in the Declaration of Independence. Another would be that, although it is a monarchy, the

English government is probably more democratic than that of the United States. Another example, for northern readers, would be that the South would probably have won the Civil War if it had possessed anything like the material resources of the North.

Contemplative curiosity may be developed into active.— Alert contemplative curiosity aroused by some of these statements may be changed into the form of mental striving for further knowledge of the situation. For example, I do not know whether the last example given in the preceding paragraph (namely, the one about the North and the South) is true or not, and I should be curious to pursue the matter farther by consulting authorities, if the facilities were available. Active striving "to see how the thing will come out" is especially useful in subjects involving a problem aspect. Some of the examples given above in the chapter on reflective thinking (pp. 172–178) might arouse such striving. Even abstract problems in geometry and physics appeal to the active curiosity of some students. Laboratory problems involving experimentation to determine results appeal to others; vocational problems to others. The skilled teacher will not only use new concrete incidents and instances and striking new general interpretations of familiar facts in order to arouse curiosity, but will also endeavor to get the students so curious that they will not be satisfied until they have found the answers to questions which have come up in the discussion. Some teachers are especially skilled in having each lesson conclude with the class vitally interested in solving some problem which they work on during the study period or at home. Thus we find that curiosity, which can be easily aroused if the instruction includes issues of real social significance, is one of the most useful instincts for securing instinctive spontaneous attention.

Collecting instinct. *Utilized in sciences; possibilities in other subjects.*—The possibilities of utilizing the collecting instinct have been most thoroughly demonstrated in the teaching of natural science. Thousands of students of botany, geology, and zoölogy have taken great interest in making herbariums and collecting rocks and insects. Very commonly such collections have not represented any very useful intellectual activity, but they are clear evidence of the power of the instinct in question. The collecting of books is another striking example. Many teachers become periodically or permanently obsessed with the idea of collecting old or rare or typical books along certain lines, often without any serious expectation of using them for purposes of study. They haunt old bookstores, study auction catalogues, and gradually accumulate a lot of unused books (so much junk) with which they clutter up their houses. Such being the strength of the human tendency to collect, it is obviously the teacher's duty to utilize the tendency as a means of getting students to concentrate their attention along useful lines. In the natural sciences the pedagogical problem is not so much to find things to collect as it is to stimulate reflective, systematic thinking in connection with the collections. In the literary and historical subjects the collecting must usually take some form that involves the use of books. With some students, bibliographical work in getting a series of references on a topic will appeal to the collecting instinct. The way the bibliographical possibilities open up after getting three or four references which lead on to others is quite fascinating to a few people. Contemporary magazines, railroad folders, announcements of summer and winter resorts and of tours, are sources for collections of great utility and interest in connection with studies in geography, civics, contemporary drama, contemporary poetry, science, mechanics and other subjects.

Manipulation. *Assists in studies through correlation.*— The instinct of physical activity is not utilized very much in the study of most high-school subjects except in the specialized form of the instinct of manipulation. This instinct is the natural tendency to be doing something with something, to change the form or arrangement of materials. It is very important in the learning and mental progress of young children, since their instinctive tendency to manipulate materials not only develops motor control and knowledge of physical properties but also involves the solution of many constructive problems. In high schools, the shop and laboratory subjects are the only ones which offer natural opportunities for manipulation. For this reason they make a powerful appeal to a great many students. This appeal is seen very clearly in manual-training or technical high schools, where not only are opportunities for manipulation offered in shop and laboratory, but the other studies are often so conducted that the initial interest aroused by manipulation is carried over into the more intellectual aspects of the curriculum. Thus, the problems in mathematics may be based on projects from the shop or laboratory; compositions may be written about the same; the history courses may emphasize the history of inventions, of manufacturing, of labor, etc. This is the phase of the instinct of manipulation that most interests us here; namely, the way in which it can be utilized to secure instinctive, spontaneous attention and interest in the various phases of school work.

Teacher holds attention by his activities. — Somewhat related to the instinct of manipulation, as well as to the instinct of curiosity, is the natural interest in watching persons or animals do things. So strong is this tendency that busy men of affairs, who affirm that they have not a moment for an interview, will stop and idly watch for five minutes while steel beams are being hoisted in the construction of a skyscraper or while a driver whose horse has fallen down gets the latter extricated from its harness and onto its feet. In the school the teacher can often secure spontaneous attention in his direction simply by doing something. His gestures often serve this purpose, as do also diagraming or sketching or outlining on the blackboard. I have seen students give rapt attention to an instructor who accompanied his lecture by making on the board marks which contained no diagrammatic suggestion; yet they got the superficial attention of the students, even though they may not have secured their reflective attention. The latter may generally be secured, however, if the teacher realizes the necessity of making his diagrams mean something to the students as well as to himself.

Communication. *The new basis of recitations.*— The instinct of communication is another strong natural tendency that can be utilized to secure spontaneous interest and attention. Nearly all persons have this instinct to some degree, although some tend to be noncommittal in general. In many persons the instinctive tendency to talk is so strong that they do it whenever opportunity offers. Certainly the instinct is strong enough on the average to make it a very useful factor in instruction. All that is necessary in order to use it is to carry out the principles laid down in the chapter on training in expression (p. 278).

Coöperation. *Limited possibilities for skilled teachers.*— The instinct to coöperate, or to work together for common ends, is one that has seldom been utilized in instruction, but which offers some very worthy possibilities which skilled teachers may use. In social life we find the instinct manifested in all kinds of social organizations in which individuals get together for some common purposes. Such organizations are formed by students themselves and include clubs and teams of all sorts. In athletic activities it is easy to arouse the interests of large numbers of students by organizing group competitions which appeal to the two instincts of emulation and coöperation. In order to stimulate all students in this way it is necessary to make it possible for all to be on teams that have a chance to win. This may be done in many cases by organizing competing teams of approximately equal weights or equal abilities. Sometimes, as in the case of bowling, each team may consist of a skilled player, a medium player, and a novice. In the case of such activities it is evident that coöperation, combined with group emulation, secures great interest.

Coöperation may be used in the pursuit of studies by group assignments in connection with projects which permit of division of labor. The example of coöperative endeavor growing out of a project in English composition, described above (on p. 276), is typical. The educational periodicals contain many reports of such coöperative projects in English courses. While coöperation comes in as a factor in such cases, the stimulus to interest is probably not so much the desire to do something for the group as it is to be known as one who had a hand in the affair or to appear prominently before the class or student body as a contributor. Much of the endeavor which is attributed to the altruistic coöperation should really be attributed to emulation for position. Some of it should also be attributed to group emulation; that is, the individual is interested in having his group win, primarily because it is *his* group. Nevertheless, there are some students who do not care particularly for position or for group rivalry, but who will work zealously and unselfishly for a common project. The opportunity to work with others for a group is what interests them. While the number of such persons is relatively small, the spirit of their endeavor is very desirable and very important to society. The teacher should arrange to secure their spontaneous interest by giving the coöperative opportunities which will appeal to them. The best way to do this will be to organize "contribution recitations," which have been discussed above in connection with training in expression (p. 288) and will be considered again from another point of view later.

Summary of discussion of use of specific instincts to secure attention. — In our discussion of the use of various instincts as a means of securing spontaneous interest and attention we noted that the appeals to the fear of physical pain and the fear of sarcasm and of ridicule, which were used so extensively for centuries, have been largely discontinued — the former almost entirely. Appeals to individual emulation, which come next in the order of historical development, are also being given up in most places. As substitutes for these we find quite general and effective use being made of the instinct of mental activity and curiosity and the instinct of physical activity and manipulation. The instinct of communication offers large possibilities, which are beginning to be realized, and the instinct of coöperation offers some limited but valuable possibilities, which may be realized by a relatively few skilled, idealistic teachers.

Habitual attention. *General attitudes of attention.* — In addition to certain fundamental instincts upon which teachers may depend for securing attention, there gradually develops a body of habits of attention upon which the teacher may count as children reach the higher grades and high school. These habits may be in the form of general attitudes and general interests or they may take the form of rather specific habitual interests or tendencies to attend. Among the more general habits are such common ones as giving attention to the teacher, to the responses of other pupils, to books when opened, etc. That these are matters of habit rather than of instinct comes out most clearly when we contrast schools or classes in which they are emphasized and developed with schools and classes in which this is not done. Nothing furnishes such a strong superficial contrast between teachers as the habits of attention of their students at the beginning of recitation periods. In some rooms pupils, from the moment of entering and taking their seats, "settle down to business," which means that they put into operation certain habitual attitudes of attention. In a mathematics class, for example, they get out paper and pencil, open their books, set down a problem, and begin to study it. In some classes, on the other hand, the students wait for the teacher to "start something"; their habits of giving attention in this class all depend upon signals from the teacher, instead of being responses to the general situation, "being in the classroom." Habits of attention are further illustrated by the tendency, which some readers have purposely built up for themselves, of refraining from looking up when they are reading in a library and someone comes into the room. Some readers instinctively look up at every interruption; others have schooled themselves not to do this. The same habit is built up with children in classrooms, and in some model schools where there are hundreds of visitors both children and teachers get so that the entering of strangers causes no interruption in their attention to the lesson.

Habitual interests in subjects. — In connection with the various studies we form thousands of special habits of attention and habitual interests. These are best illustrated by the attention of advanced specialists, who notice particularly the matters related to their own lines of specialization. Thus, in glancing over a row of books in a library, a historian will note especially books on history, a psychologist those on psychology, etc. Students form similar habits as they progress through school. Thus, in high school the teacher of English composition, for example, may build upon certain habits, which pupils have formed in the grades, of giving attention to capitals, periods, and headings, and can assume a certain amount of habitual interest in neat papers, even margins, and clearly expressed thought, if the children have been well taught. Similarly, the teacher of third-year science in high school can count upon students having habits of observing certain types of physical and biological phenomena and having habitual interests in certain changes in color, weight, temperature, and growth, whose significance they have learned in their previous science courses. The necessity of building upon these acquired interests and relating instruction to them was emphasized in the chapter on apperception. If the teacher can connect the new experiences with habitual interests that the students have formed either in school or out of school, they may "lay hold of the new experiences and reach out after more."

Teachers must study interests of high-school students. — The adequate utilization of both the instinctive and the habitual interests of students as a means of securing concentration of attention and economical learning necessitates a thorough knowledge of the interests of high-school boys and girls on the part of the high-school teachers. In many cases the teacher needs to have his eyes opened and his standpoint broadened by getting an insight into the lives of students who are of a different type from himself. For example, if he is extremely religious, he ought to try to realize the point of view of the students in whose life religion does not play much part, and vice versa. If he is sociable and convivial, he ought to try to get the point of view of the student who is bashful and lonesome. If the teacher has never been anything except a "grind," he ought to try to appreciate the boys whose interests run primarily to athletics and student politics. For in all these cases education will progress most economically if the energies of the students' instinctive and habitual interests can be utilized instead of opposed. I have heard it said that one of the best means of attaining the broad point of view advocated here is to read George Meredith's "Ordeal of Richard Feverel."

Further practical examples.—In order to appreciate more completely the practical bearings of some of the points made in this chapter, students should read the references to Charters' "Methods of Teaching" and Thorndike's "Principles of Teaching" given in the bibliography on page 361. In the former, note especially the practical examples, and in the latter, work the exercises that apply to high-school instruction.

Conclusion of discussion of interests.—This concludes our discussion of the use of present interests as a means of securing economy in learning. We have seen that superior results are secured by methods of instruction which utilize students' interests. Of the many powerful instincts that might be utilized as the basis of spontaneous interest in and attention to instruction, the largest and best possibilities are found in the instincts of mental activity and curiosity, manipulation and communication. The skilled teacher will also build upon the habitual interests which students have acquired in and out of school. To familiarize himself with the instinctive and habitual interests of his students, he will make a study of adolescent boys and girls of all types.

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7. Thorndike, E. L. *Principles of Teaching*. (A. G. Seiler, 1906.) Pp. 21–39, 51–67, 105–109. The best pedagogical discussion of interests and attention, with their instinctive basis. The practical exercises should be discussed in class.

Referred to incidentally in the chapter. 8. Quick, R. H. *Educational Reformers*. (D. Appleton and Company, 1890.)

Exercises. — For problems for discussion, see pp. E177–E187 of *Exercises for "Methods of Teaching in High Schools."*

CHAPTER XV

ADAPTING CLASS INSTRUCTION TO DIFFERENCES IN CAPACITY

Main points of the chapter. — 1. The method of class instruction and recitation which is commonly used involves an enormous waste of time for both the fast and the slow members of a class, the former often having nothing to do, while the latter are dragged along so rapidly that they get little or nothing out of the subject.

2. Statistical measurements show that the brightest pupil in a class of ordinary size can do, in the same amount of time, from two to five times as much as the slowest pupil.

3. Since the year 1900 considerable interest has developed in the devising of methods of varying class instruction so as to adapt it to the differences in the capacities of the members of the class. The following are typical experiments:

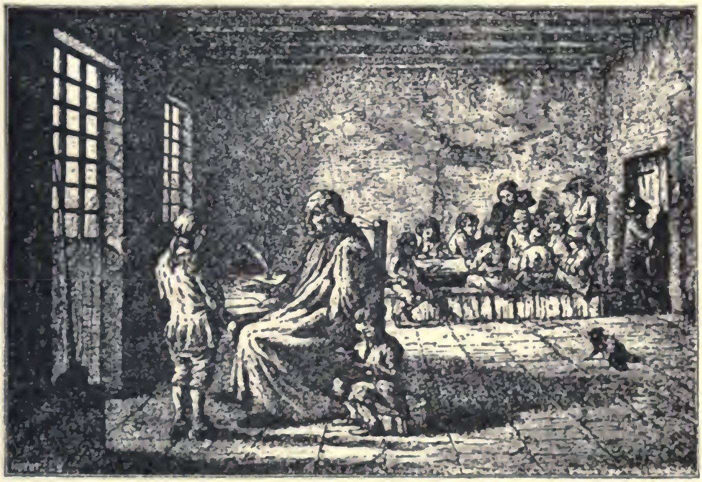
a. The abolishing of all class recitations and the substituting of individual instruction, each pupil advancing at his own rate. This is known as the Pueblo plan.

b. The division of classes into slow, medium, and fast sections, each advancing at its own rate, partially under the direction of monitors.

c. Requiring only students who need the recitation to give attention to it, and providing special supplementary assignments for the fast pupils.

d. The organization of required periods of supervised study during which individual attention is given to individual students by the teacher. This is known as the Batavia plan and is discussed at length in the next chapter.

Class instruction needs supplementing to suit individuals. — One of the most-needed improvements in class instruction which is advocated at the present time is the varying of the pace at which members of the class are expected to advance, so as to eliminate the enormous waste that commonly results from the brightest students being idle a large part of the time and the poorest students being dragged along so rapidly that they fail to profit by the instruction. People in cities are so familiar with the system of class instruction with little or no variation for individual needs that they fail to appreciate the fact that for many years nearly all instruction was given to individuals, and that the present class methods can be greatly improved by introducing some modifications that would vary the subject matter and the pace to suit the varying needs of different students. We shall take up briefly the historical development of the present method of class instruction and the movement for its modification, and shall describe some of the practical innovations that have been tried.



A FRENCH SCHOOL BEFORE 1789

Note the method of individual instruction. After Cubberly

Historically, individual instruction prevailed for centuries. — Up to the nineteenth century the common method of instruction in schools was individual instruction. As a rule, each pupil advanced to the teacher's desk when his turn came, recited upon the work which he had prepared, received a new assignment in the form of directions or questions, and returned to his seat, presumably to continue his studying. When there were only a few students (as often happens even at the present time in some rural schools), and no two at the same stage of advancement, this would seem to be the natural method to follow. But it was used not only under these circumstances but also when schools were quite large and contained many students doing the same work. For example, it was used in the dame schools, where there were only beginners learning to read. Even if there were twenty pupils, the teacher would call up each one in turn and, pointing at the alphabet, would say, "That is A; that is B; that is C." Then, pointing at "A," she would ask the child, "What's that?" and so on. Similar methods were used in advanced classes in the elementary school (for example, in arithmetic) and also in the Latin grammar schools. The picture given on page 363 illustrates this practice.

Exceptions in schools of La Salle and Lancaster. — Exceptions to the dominant individual method down to the first part of the nineteenth century are commonly given in the histories of education as forerunners of a significant educational reform. These exceptions are few and notable. On the theoretical side, Comenius (1592–1670), the great educational innovator of the seventeenth century, proposed to substitute class instruction for the individual method. On the practical side, La Salle (1651–1719), who organized the Brethren of the Christian Schools in 1684, introduced simultaneous class instruction on a large scale in the schools of this organization, which provided very efficient instruction throughout France. The Lancasterian monitorial system, which was popular in large American cities from 1805 to 1830, also organized class or group instruction very effectively. In this system the groups were very carefully graded so as to contain about ten pupils of almost equal rank. Each group was taught by a bright, capable student known as a monitor.

Simultaneous instruction. *Adopted during the nineteenth century.* — These successful innovations contrasted very strongly with the poor instruction that prevailed in the ordinary schools which were using the method of individual instruction. During the nineteenth century, however, fairly careful grading of the large numbers of students attending city schools became the dominant practice, and along with this there developed the almost universal use of the simultaneous method of class instruction in all cities. Naturally, since the results accomplished under this system were so superior (partially owing to simultaneous instruction but also partially caused by other innovations), it seldom occurred to a school-teacher or administrator that any improvement could be introduced as a modification of the simultaneous method. "Had n't it supplanted the individual method with greatly improved results?" they thought. "What else could be desired?"

Criticized by W. T. Harris. — This feeling of thorough satisfaction with pure simultaneous instruction was not shared by all school authorities, however. Toward the end of the nineteenth century a few of the more progressive leaders began to call attention to the defects in this method and to suggest modifications which would make some provision for varying class instruction so as to meet the needs of students of different degrees of ability. Perhaps the greatest practical public-school administrator of this period was William T. Harris (1835–1908), Commissioner of Education of the United States from 1889 to 1906. As superintendent of the schools of St. Louis from 1867 to 1880 Mr. Harris introduced many remarkable reforms which were adopted by other cities much later. He appreciated the advantages as well as the defects of the method of simultaneous instruction and called attention to both in an article published in 1872. The advantages, he said, are:

> (*a*) a great increase in the length of recitation [for each pupil, since each had as much time as his group]; (*b*) far more thoroughness in the discussion of the lesson, sifting the different statements and probing the meaning of the same; (*c*) great stimulation of the mental activity of the pupil through trial and competition with other members of his class. These three advantages can scarcely be overestimated. They multiply the teacher's power just as organization improves the strength of the army. (**1**: 266)

On the other hand, Mr. Harris described the disadvantages of simultaneous instruction in the following words:

> It is this very system that is so organized as to prove the very greatest of all causes for the early withdrawal from school. . . . The tendency of all classification is to unite pupils of widely different attainments. . . . The consequence is that the lesson is too short for some and too long for others. The best pupils in class are not tried to the extent of their ability. . . . The poorest pupils of the class are strained to their utmost. They are dragged, as it were, over the ground. . . . This develops the result that the overworked pupils are frequently discouraged and drop out of the class and likely enough out of the school altogether. (**1**: 266)

Lock-step in education condemned by P. W. Search. — Perhaps the most vehement critic of the simultaneous method during the latter part of the nineteenth century was P. W. Search, who wrote a book called "An Ideal School" (1901), in which he described experiments to provide for individual differences in capacity, that were undertaken in school systems of which he had been superintendent. These experiments will be described below (p. 379). Mr. Search was typical of a small group of schoolmen who were vigorous in their condemnation of what they called "the lock step in American education," thus tending to attach to the simultaneous method the odium of a prison practice. These men had relatively little effect upon educational practices, and it was not until after 1900 that there developed any strong tendency to provide for individual differences in capacity in instruction in public schools.

Recent enthusiastic interest in individual differences. — Since 1900 there has been a very radical change in the general attitude toward provisions for individual differences. In fact, in contrast with the general indifference which preceded, the present period is marked by enthusiastic endeavor not only to modify or supplement the simultaneous method but also to provide for individual differences by the organization of special schools and classes for students of different types of ability and interest.

Stimulated by statistical demonstrations of differences and waste. — One of the most important influences in bringing about this change of sentiment has been the statistical investigations of the amount of difference in capacity which prevails in the ordinary graded classes, supplemented by statistical studies of the retardation of students and of the amount of time wasted through students getting behind grade. The work of Professor E. L. Thorndike and Dr. Leonard Ayers has been particularly influential in this connection. Thorndike's "Educational Psychology," published in 1903 (revised, 1910 and 1913), and his "Principles of Teaching" (1906), contained chapters which demonstrated clearly, on a statistical basis, just how great the amount of difference in capacity between the fast and the slow members of an ordinary class really is. The general statement of this amount of difference is made in his "Principles of Teaching" in the following words:

> Roughly speaking, the teacher of a class, even in a school graded as closely as is possible in large cities, where two classes are provided in each building for each grade and where promotion occurs every six months, will find in the case of any kind of work some pupil who can do from two to five times as much in the same time, or do the same amount from two to five times as well, as some other pupil. The highest tenth of her class will in any one trait have an average ability from one and three-fourths to four times that of the lowest tenth. (**10**: 73)

Sample papers show extreme differences in ability. — As a sample of typical variations in ability in high-school classes, Thorndike gives two Latin translations, of which portions are quoted below.

Two translations made by two pupils [A and B] of the same grade and class (and age).

The passage to be translated was as follows:

Atticus adolescentulus propter affinitatem P. Sulpicii, qui tribunus plebi interfectus est, non expers fuit illius periculi. Namque Anicia, Pomponii consobrina, nupserat (M.) Servio, fratri Sulpicii. Itaque interfecto Sulpicio, posteaquam vidit Cinnano tumultu civitatem esse perturbatam neque sibi dari facultatem pro dignitate vivendi, quin alterutram partem offenderet, dissociatis animis civium, cum alii Sullanis, alii Cinnanis faverent partibus, idoneum tempus ratus studiis obsequendi suis, Athenas se contulit.

A's Translation

Atticus a young man because of his friendship with Sulpicius, the tribune of the people who was killed was not free from this danger. For Anicia the wife of Pomponius had nursed Servius, brother of Sulpicius. And so after Sulpicius was killed and after he saw that the state was aroused by the revolt of Cinna and that no opportunity was given for him to live in accordance with his dignity without offending one or other of the parties, for the minds of the people were divided, some favoring the party of Sulla, some that of Cinna, and after he thought it was a proper time for pursuing his studies, he betook himself to Athens.

B's Translation

Atticus a youth on account   of P. Sulpicus who was a tribune of the people, was not   of his danger. And for Anicia,   of Pompey, had   , the father of Sulpicuo. And so by the killing of Sulpicius, after he saw the state to be disturbed by a tumult nor to give to himself the ability on account of his dignity, that might offend the other part, the unassociated minds of the citizens. with some Sullani other Cinnane might be favored by some   the time was followed with their desires, Athens carried itself.

In comparing these translations it is obvious that pupil B needs considerable quizzing and discussion to enable him to get the desired results, but that most of the time spent in the ordinary translation activity in class would be wasted for pupil A. It is evident that the ordinary method of simultaneous class instruction fails to provide adequately for either of these pupils.

A similar contrast appears in the case of the two algebra papers quoted on page 370, from Thorndike's "Principles of Teaching." These papers were written by two pupils, A and B, members of the same class, in a test in algebra. The test on which they were based is given below.

Do these examples as quickly as you can.
Do not copy them, but put the work right under each example.
Take the quickest way you can to get the correct answers.

1. Simplify

$$\left(\frac{a^2-b^2}{x-y}\right)\left(\frac{x^2-y^2}{a-b}\right)\left(\frac{c^2}{x+y}\right)$$

2. What are the values of x and y if

$$5x+3y=8 \qquad \text{and} \qquad 7x-3y=4$$

3. A shepherd, being asked how many sheep he had in his flock, said, "If I had as many more, half as many more, and seven sheep and a half, I should then have 500." How many sheep had he?

4. What are the values of x and y if

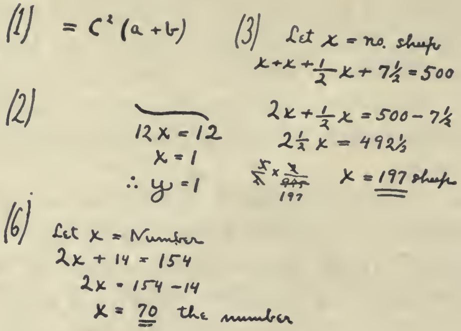
$$1-\frac{x+y}{x-y}=\frac{3x}{x-y} \qquad \text{and} \qquad \frac{7x-3y}{23}=3$$

5. Simplify

$$\frac{\dfrac{m+n}{m-n}+\dfrac{m-n}{m+n}}{\dfrac{m-n}{m+n}-\dfrac{m+n}{m-n}}$$

6. If, to the double of a certain number, 14 be added, the sum is 154. What is the number?

A's Paper



(1) $= c^2(a+b)$

(2) $\overbrace{\qquad\qquad}$

$12x = 12$

$x = 1$

$\therefore y = 1$

(3) Let x = no. sheep

$x + x + \frac{1}{2}x + 7\frac{1}{2} = 500$

$2x + \frac{1}{2}x = 500 - 7\frac{1}{2}$

$2\frac{1}{2}x = 492\frac{1}{2}$

$\frac{\cancel{5}}{\cancel{2}} \times \frac{\cancel{2}}{\underset{197}{\cancel{985}}}$ $x = \underline{\underline{197}}$ sheep

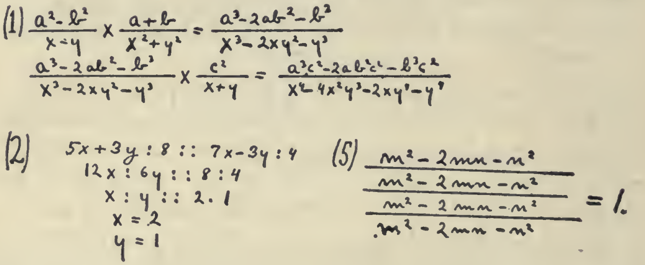
(6) Let x = Number

$2x + 14 = 154$

$2x = 154 - 14$

$x = \underline{\underline{70}}$ the number

B's Paper



(1) $\frac{a^2-b^2}{x-y} \times \frac{a+b}{x^2+y^2} = \frac{a^3-2ab^2-b^3}{x^3-2xy^2-y^3}$

$\frac{a^3-2ab^2-b^3}{x^3-2xy^2-y^3} \times \frac{c^2}{x+y} = \frac{a^3c^2-2ab^2c^2-b^3c^2}{x^4-4x^2y^3-2xy^4-y^4}$

(2) $5x+3y : 8 :: 7x-3y : 4$

$12x : 6y :: 8 : 4$

$x : y :: 2 . 1$

$x = 2$

$y = 1$

(5) $\dfrac{\dfrac{m^2-2mn-n^2}{m^2-2mn-n^2}}{\dfrac{m^2-2mn-n^2}{m^2-2mn-n^2}} = 1.$

Teachers should understand use of median and mode.— In order to develop some skill in estimating the range of ability represented in classes, teachers should have some practice in examining tables showing the distribution of abilities or achievements, such as those given on page 373. A most necessary and useful figure for making comparisons is one that will represent the "center of gravity," or central tendency of the group. Ordinarily, persons who have not had statistical training use the *average* for this purpose, but this usually involves elaborate calculations which consume time. A simpler method is to find the *median* (that is, the point on either side of which lie 50 per cent of the cases) by noting the total number of cases, dividing by 2 to get half the number, and then counting in this amount from either end. A still easier figure to use to represent the central tendency of a group that is normally distributed is the *mode*. This is the most frequent grade of ability shown in the table. Thus, in the left-hand table on page 373 the mode would be 40 to 44. In this case it is almost the same as the median.

Teachers should study statistical tables of abilities.— The reader should now examine the left-hand table on page 373 and derive the answers to the following questions :

1. What is the lowest score made ?
2. What is the highest score made ?
3. How many times is the lowest score contained in the highest ?
4. How many individuals approximated the lowest score ?
5. How many approximated the highest score ?
6. What is the most frequent score made ; that is, the mode ?
7. How many times is the mode contained in the highest score (or scores) ?
8. If the instruction is adapted to the middle part of the class (roughly, the mode), how much time will the brightest pupil (or pupils) probably have to spare ?
9. How many times is the lowest score (or are the lowest scores) contained in the mode ?
10. If the instruction is adapted to the middle part of the class, how many times too fast will the pace be for the slowest pupil (or pupils) ?

Answer the same questions for the table on page 374.

Bright pupil may have half of his time to spare.— Whenever a table showing the distribution of abilities of students in classes is found, it should be studied by deriving the answers to the above questions. This practice will make concrete and fix in the student's mind the statement that in the ordinary graded classes that are taught entirely by the simultaneous method the brightest pupils are likely to have from one fourth to one half of their time to spare and the slowest to be dragged along at a pace that is twice as great as it should be for them. Even worse is the condition when the whole class period is used merely for class recitations on material studied at home. Under these conditions the whole class period is often wasted for the brightest pupils, while the slowest ones get almost nothing out of it.

Distribution of abilities in high-school classes. *Speed in reading.* — Courtis investigated the speed attained in normal rapid reading and in careful reading among one hundred seventy-five high-school children. He concluded that if his test had been so administered as to give the fastest readers a chance to do their best, the

> pupils would undoubtedly have varied from 200 words per minute to 500 words per minute for normal reading, and from 60 words per minute to 400 words per minute for careful reading. When the vital nature of ability to read and understand is considered, this range of ability to read the simplest prose becomes very significant. (**12** : 389)

Although Courtis gives these comparisons for the high school as a whole, they probably apply equally to the range in a given grade, since his figures show little change in the average rate of reading throughout the grades.

Algebra. — W. S. Monroe investigated the abilities of first-year high-school students in algebra by using a series of carefully devised tests. He secured such results as are shown in the table on page 374.

Arithmetic. — In an investigation of methods of teaching commercial arithmetic in high schools, G. A. Beers conducted, in his regular high-school arithmetic classes, tests in the various phases of the subject — addition, subtraction, multiplication, aliquot parts, etc. The results were carefully scored and distribution tables constructed for each class in each process.

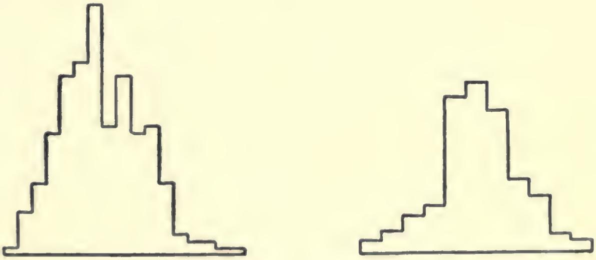
ABILITIES OF SIXTH-GRADE GIRLS IN OBSERVING MISSPELLED WORDS

NUMBER OF MISSPELLINGS NOTICED	NUMBER OF CHILDREN
10 to 14	1 girl
15 to 19	6 girls
20 to 24	10 girls
25 to 29	18 girls
30 to 34	25 girls
35 to 39	27 girls
40 to 44	35 girls
45 to 49	18 girls
50 to 54	25 girls
55 to 59	17 girls
60 to 64	18 girls
65 to 69	10 girls
70 to 74	3 girls
75 to 79	2 girls
80 to 84	2 girls
85 to 89	1 girl
90 to 94	1 girl

ABILITIES OF FOURTH-GRADE GIRLS IN THINKING OF THE OPPOSITES OF WORDS

SCORE MADE IN TEST WITH OPPOSITES	NUMBER OF CHILDREN
−9 to −5	3 girls
−4 to 0	5 girls
0 to 4	8 girls
5 to 9	10 girls
10 to 14	33 girls
15 to 19	36 girls
20 to 24	29 girls
25 to 29	16 girls
30 to 34	11 girls
35 to 39	4 girls
40 to 44	3 girls

The minus scores given above result from a pupil's writing the wrong opposites for words and not writing enough correct opposites to balance her errors



GRAPHIC REPRESENTATION OF THE ABOVE STATISTICS

NOTE. The above data, quoted from Thorndike's "Principles of Teaching," illustrate the use of tables of frequency and graphic methods of representing the same.

ABILITIES OF FIRST-YEAR HIGH-SCHOOL STUDENTS IN ALGEBRA

A two-minute test in working simple multiplication problems in algebra of the type $4(3x-4)=?$, $-5(-4\times 6x)=?$

NUMBER OF EXAMPLES DONE	ATTEMPTS			RIGHTS		
	Boys	Girls	Total	Boys	Girls	Total
34		1	1			
33		1	1			
32					1	1
31						
30		1	1		1	1
29		1	1			
28		1	1			
27	1	4	5		2	2
26	3	1	4	2	1	3
25	2	2	4	1	2	3
24	5	2	7	3	1	4
23	5	8	13	4	6	10
22	7	8	15	4	4	8
21	3	9	12	2	7	9
20	2	6	8	3	10	13
19	7	8	15	6	3	9
18	13	13	26	11	7	18
17	12	15	27	8	8	16
16	11	18	29	10	14	24
15	17	17	34	12	14	26
14	7	7	14	12	16	28
13	7	16	23	10	11	21
12	3	7	10	5	7	12
11	3	6	9	5	3	8
10	5	2	7	4	9	13
9	1	1	2	3	4	7
8	3		3	3	9	12
7		1	1	1	3	4
6	2		2	2	4	6
5				3	1	4
4					2	2
3		1	1	2	2	4
2					2	2
1				1	1	2
0				1	1	2

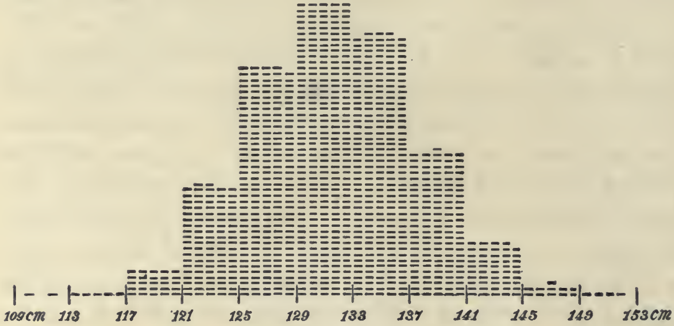
Approximately the same range of variation in abilities was shown as in the case of elementary-school classes; that is, the brightest students did from four to six times as much as the slowest ones and (roughly) twice as much as the median pupils.

Teachers should learn to make and read graphs of differences in abilities. — As a result of such statistical practice as that described on page 371 the teacher or prospective teacher should get into the habit of thinking of any fair-sized class that he teaches as being a group made of a great variety of abilities distributed with the mode near the middle and with fewer students for each degree of ability as one proceeds toward the high and low ends of the class. In order to make it easier to think of this condition, it is desirable to draw graphs showing the distribution of abilities in pictured form so that it can easily be taken in at a glance. Such graphs are sometimes called surfaces of frequency and are most easily made on square-ruled or cross-section paper. Degrees of ability are represented from left to right on the horizontal line, and the number of cases for each degree of ability is represented by the height of the column erected at the appropriate place on the horizontal, or base, line.

A simple explanation of such a surface of frequency is given by Thorndike in connection with the distribution of stature in American boys ten and a half years old. He says:

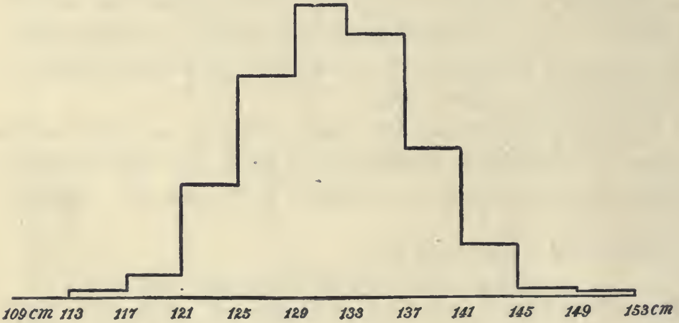
> Out of 1000 boys there are
>
> | | |
> |---|---|
> | Between 109 and 113 centimeters tall, | 2 boys |
> | Between 113 and 117 centimeters tall, | 5 boys |
> | Between 117 and 121 centimeters tall, | 25 boys |
> | Between 121 and 125 centimeters tall, | 97 boys |
> | Between 125 and 129 centimeters tall, | 199 boys |
> | Between 129 and 133 centimeters tall, | 255 boys |
> | Between 133 and 137 centimeters tall, | 228 boys |
> | Between 137 and 141 centimeters tall, | 126 boys |
> | Between 141 and 145 centimeters tall, | 49 boys |
> | Between 145 and 149 centimeters tall, | 11 boys |
> | Between 149 and 153 centimeters tall, | 4 boys |

The facts of the above table become clearer to the eye if, instead of the numbers 2, 5, 25, 97, etc., we draw 1000 little lines as in [the first of the figures below], letting each line stand for one boy. (**9** : 9)



EXAMPLE OF A SURFACE OF FREQUENCY, REPRESENTING STATURE OF 1000 AMERICAN BOYS

Represents statistics shown in table on page 375

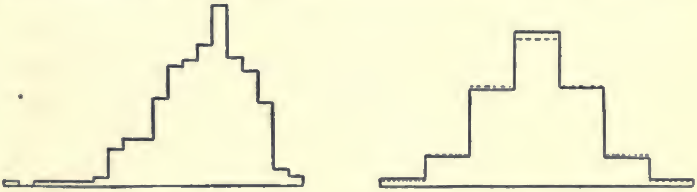


EXAMPLE OF A DISTRIBUTION CURVE. SAME DATA AS THAT PRESENTED ABOVE, BUT REPRESENTED HERE AS AN OUTLINE INSTEAD OF AS A SURFACE

From Thorndike's "Individuality"

Proceeding in a similar way, the left-hand figure on page 373 is drawn to represent the facts given in the table shown above the drawing. Beginning at the left, or lower end of ability, the curve would read, in a rough way, as follows: Here is one subject who made a score of 10 to 14. As we proceed to the right the piles increase in size until we reach the mode at 40 to 44; from here to the right the piles decrease in size until we reach the highest score at 90 to 94, represented by one girl.

Human abilities distributed according to normal-frequency surface.—The graphs, or surfaces, pictured on pages 376–377 approximate what is known as the normal-frequency surface. The measurements of any biological characteristic (plant or animal), which is studied in a sufficient number of cases of individuals of the same general type, will appear in the form of the normal-frequency surface when they are plotted. In the case of human beings these biological measurements might be made of a very simple characteristic, such as the length of the second joint of the index finger in five hundred English male adults; or they might be of a very complex characteristic, such as the height of English male adults (total height being considered complex because it is really composed of the sum total of the lengths of a great many bones). Even measurements of *mental* characteristics of human beings who are all of the same general type show this normal form of distribution. Thus, if we tested three hundred first-year high-school boys in their ability to add



MEMORY SPAN FOR DIGITS IN 129 WOMEN STUDENTS

REACTION TIMES OF 252 COLLEGE FRESHMEN

Curves showing general type of distribution of simple mental abilities of mature students. After Thorndike. (**15** : 325) numbers, to memorize nonsense syllables, to mark out all the verbs in a printed page, etc. the surfaces of frequency which we should get when the results were plotted would approximate the normal curve. Examples of such curves of distribution or surfaces of frequency for human abilities are shown in the figures on page 377.

Hence abilities and marks in ordinary classes follow normal curve. — Similar normal curves are obtained if the marks made by a sufficient number of students of the same grade in any school subject are tabulated and then plotted, provided these marks represent the real relative achievements. Thus, if a teacher of algebra with five classes of thirty students each would give at the end of the first semester a test which would give all pupils a chance to show just how much and how well they could do in a limited period of time, the one hundred fifty scores which resulted would prove to be distributed according to the normal curve. A special technique must be observed in such testing, which will be discussed in Chapter XXII. The distributions shown in Monroe's table on page 374 give the results of such an algebra test and illustrate the normal distribution of abilities of high-school students.

In view of the fact that reliable tests of the mental abilities of nonselected groups show the normal distribution, the teacher of any subject in high school should form the habit of expecting such a distribution of the term grades or final grades of his students when he has a sufficient number; that is, if he has only five, ten, or even fifteen students in one class in algebra, the distribution might be different, but if he has fifty in two or more classes, the chances are pretty large that the normal distribution will be found, and this is almost certain if he has ninety or more pupils in the same subject and grade. (Compare **13** and **14**.) In more concrete terms, this would mean that if the teacher was using a marking system consisting of the letters A, B, C, D, E, his grades or marks in the long run should be distributed roughly as follows:

3 per cent of the grades should be A
22 per cent of the grades should be B
50 per cent of the grades should be C
22 per cent of the grades should be D
3 per cent of the grades should be E

Typical experiments in adapting instruction to differences in capacity. — The statistical proofs of the amount of the differences in capacity to be found in ordinary classes have aroused a general interest in securing a means of modifying the method of simultaneous class instruction in such a way as to vary the pace for the slow, the medium, and the fast pupils. A number of experiments have been tried, and some of these will be discussed under the following headings:

1. Abolishing all class instruction and reverting to the individual method: the Pueblo plan.

2. Self-conducted homogeneous groups: a modified form of the monitorial scheme.

3. Recitations only for students who need them; seat work for others.

4. Required supervised study periods supplementary to recitation periods: the Batavia scheme.

1. **Abolishing class instruction and reverting to individual instruction: the Pueblo plan.** — In 1888 P. W. Search became superintendent of the schools of Pueblo, Colorado. He found the parents of the high-school students complaining of over-pressure in connection with home study. To relieve this situation, all home study was abolished and experiments undertaken to have all studying done during school hours. The final result was a scheme in which studying occupied the greater part of the school day and nearly all recitations were abolished. Each pupil, working at his desk, advanced as rapidly as he could master the assignments. Naturally, some did much more than others.

For example, Mr. Search, in his book entitled "An Ideal School," describes the achievements of the members of a Latin class that was studying Cæsar. During a given length of time the fastest pupil completed 140 chapters, the slowest only 40 chapters. One pupil completed 110 chapters, three completed 95, five completed 90, and one completed only 45. The rest of the members were distributed between these extremes.

These figures show approximately the same relations between students of different degrees of ability as were brought out in the tables given above. Thus the brightest pupil did three and a half times as much as the slowest, and twice as much as the median. Instead of marking time while most of the class accomplished the amount ordinarily done, the brightest forged ahead. Moreover, instead of the slow pupils being dragged over assignments which they had not mastered, they worked diligently as long as was necessary on the amount that they were capable of mastering. There was evidence in the form of individual recitations and quizzes and examinations to show that pupils who covered given assignments did so satisfactorily.

Several favorable reports on Pueblo plan. — The Pueblo plan was tried in a few other places, and in some cases very favorable reports were made concerning its success. Occasionally graduate students in my classes, who have been skilled high-school teachers, have reported that they use the Pueblo scheme regularly in teaching classes in mathematics and have found it works quite satisfactorily. They state that they never have any class discussions even in attacking a new principle. Each pupil begins work on a given principle or new operation when he reaches it, and the teacher, in passing around the room, watches him and makes such suggestions as the student seems to need.

Too difficult for unskilled teacher to keep track of one hundred fifty individuals. — One of my students (Mr. I. M. Allen), however, reported an experiment with the Pueblo plan that brought out a serious objection to its being used by any except skilled, resourceful teachers. As principal of a large high school he was interested in finding some method that his teachers could use to meet the needs of pupils of varying capacities. He decided to try the Pueblo plan himself with an algebra class before asking his teachers to use it. He did so, and found that it accomplished all that was claimed for it by its advocates, but that it taxed his ingenuity and resourcefulness to keep track of thirty students in one class, all of whom were progressing at different rates. He decided that if it troubled him to keep track of thirty pupils by the method of pure individual instruction, it would be entirely too much to expect an ordinary mathematics teacher to keep track of one hundred fifty students, assuming that he had five classes with thirty students in each.

Additional objections to the Pueblo plan are based on its elimination of all the social elements that accompany the class method of instruction. The chief value lost is the training in expression that students receive in well-conducted contribution recitations. Another important loss is the training in thinking in a complex social situation such as the group recitation offers. In view of these losses, as well as the difficulty of keeping track of so many individuals at different stages of advancement, most educators would not favor the Pueblo plan with its abolishing of class recitations.

2. **Self-conducted homogeneous groups: a modified form of the monitorial system.**—A modified form of the monitorial system was used for years in the geometry classes in the high school which I attended. The classes usually numbered from twenty to twenty-five students and met in fairly large rooms with ample blackboard space. Each class was divided into three sections containing from six to eight students each. The brightest students composed the first section, the medium students the second, and the slow students the

third section. The first section had as a permanent monitor, or captain, one of its most capable students; that is, one who possessed executive and teaching ability as well as ability in mathematics. The second section had a similar monitor from among its own numbers, one who might not be as capable or quick in mathematics as the members of the first section, but who was among the best in his own section and had executive and teaching capacity. For the third or slow section, monitors from the other sections were provided from week to week or for slightly longer periods. Each of these monitors for the third section would be absent from the recitations of his own section during his period of service with the third section, but he could easily keep up or catch up with his own section.

Bright section completes plane and solid geometry in one year. — After the teacher had got the class started as a single group on the first book, and some of the fundamental ideas of geometric procedure had been established, the sections were organized on the basis of the students' records in previous work as well as their ability as shown in the new work. Each section was then assigned a corner of the room as its regular recitation place, and henceforth each section proceeded at its own pace through the geometry. The first section commonly completed the plane and solid parts of Wentworth's Geometry in one year. The medium section usually completed the plane geometry only (that is, five books), as is commonly done by classes using the simultaneous method. The slow section usually got through about four books, but most of its members managed to do this much with a fair degree of thoroughness, instead of being dragged over the whole five books in an uncomprehending way, as commonly occurs when the ordinary class method is used.

Three recitations simultaneously without confusion. — At the beginning of each recitation period the monitor of each section assigned each student a proposition or exercise to demonstrate. Each pupil put on the blackboard the figure to be used in his demonstration, with a few of the more important statements in the demonstration. This usually took from five to ten minutes. The remainder of the period was spent by each section listening to and discussing the demonstrations by its members. Usually these were demonstrations that had been studied out at home, but if the teacher were wise enough to suggest it, the period was partially used for group study and discussion of new propositions or exercises. Inasmuch as no rowdy behavior was tolerated in the school, and the students spoke in low tones but sufficiently loud to be heard by a small, compact group, the three recitations proceeding simultaneously produced no confusion. The teacher divided his time between the sections as he thought best. Sometimes he simply looked on; sometimes he made suggestions; sometimes he took full charge of a section for as long as he saw fit.

Stimulated intense study of difficulties by groups. — This scheme had many educational advantages apart from its variation of the pace to suit the capacities of the three types of students. The chief of the advantages was the intense geometrical thinking done by the members of each section when it was working out puzzling points in propositions or exercises. The sections being fairly homogeneous, a serious difficulty for one member of a given section would be likely to be a difficulty for all its members. Hence it would be worth while for the group to work it out. This condition contrasts very strongly with that presented in recitations conducted for the whole class. In the latter case, difficulties which would puzzle the slow students for fifteen minutes might not be difficulties at all for the bright pupils. The teacher either has to let the bright pupils tell the solution, thus depriving the slow ones of participation in the activity of finding it, or he has to call on the slow ones to work it out, allowing the fast ones to mark time meanwhile.

Another advantage of these sectional recitations is the fact that each student gets an opportunity each day to recite at some length to an audience that is usually attentive and critical.

Only skilled teacher can use method successfully.— Needless to say, an unskilled teacher in a school where there was no well-defined spirit of work and serious behavior would have difficulty in administering this monitorial sectional method in geometry, but a skilled teacher in whose classroom the spirit of serious work and application always prevailed could probably secure better educational results by some modification of this system than by any other. It could easily be adapted to use in other mathematics classes, such as those in algebra and trigonometry. It could probably be used to advantage in any subject where there is a large amount of fairly routinized practice in studying and mastering material in textbooks — for example, in Latin translation. In all such cases the teacher must be more interested in the process of thoughtful study and mastery of the material by the students than in covering a given amount of ground.

3. **Recitations only for students who need them; seat work for others.** — Both of the methods described so far (namely, the Pueblo scheme of individual instruction or progress and the monitorial sectional plan) provide for different rates of advancement by different students throughout the course. The scheme now to be described holds the class together as far as progress through the essential steps of the subject is concerned, but enables the brighter pupils to do more intensive work at each step and saves their time by excusing them from paying attention during some of the recitations.

Time wasted by bright students in algebra recitations.— The desirability of such a method is illustrated from one period in my own experience, when I taught algebra very unskillfully in high school, using the ordinary method of conducting recitations upon material that had been studied at home the night before. My younger brother was in one class, and, being a bright, conscientious student, he mastered at home every evening, without assistance, the lesson for the next day. Consequently, when he came to class, there was practically nothing for him to do but sit as a spectator, except when he was given an opportunity to contribute. I recall two other students in the same class that were the only ones who caused me any concern about discipline. They also were bright pupils who had got all the meat out of the set of problems under discussion, but instead of sitting as polite spectators they insisted on devising ingenious pranks that amused me so much that I was always at a loss to know what to do. Unfortunately it did n't occur to me to excuse them from participation in the recitation and to devise assignments of extra problems that would interest them and serve as an outlet for their ingenious energy.

Three factors in scheme for special seat work. — Such a scheme for saving time and for proportioning to their capacities the amount of work expected of individual pupils is often used by skilled teachers who have mastered the ordinary routine of handling classes and are interested in devising and organizing varied assignments. When skillfully administered, the scheme involves at least three features; namely, (1) the minimum essentials of the subject to be covered by the slow students; (2) supplementary assignments for the bright pupils; (3) arrangements to conduct recitations only for those who need them.

1. *Standardized minimum essentials for the slow.* — The idea of standardizing quite definitely the minimum essentials in elementary and high-school studies has only recently been generally applied. The importance of the practice can readily be appreciated when one considers, for example, what a very small part of grammar-grade arithmetic is necessary for the student who is lacking in mathematical capacity and who, as

a consequence, would not secure a position in life as an accountant. For such a student, only the bare essentials of the subject should suffice to give him a passing grade. The same principle applies to most high-school subjects, and its application is readily illustrated by the topic of factoring in algebra, which has already been discussed from this point of view on page 82.

2. *Standardized, mimeographed, supplementary assignments for bright pupils.*—Supplementary assignments for the brighter students should be just as definitely routinized and standardized as the minimum essentials for the slow. Hence, the teacher should have, very definitely outlined on paper, statements of supplementary topics or problems, with exact references to material to be used in studying, means of securing the material, etc. Sometimes the supplementary material could be in the form of another textbook to be bought by the student and brought to class regularly. More commonly, the teacher will have in the room a small working collection of books for supplementary assignments. Such supplementary collections are provided by the school authorities for every room in well-equipped elementary schools and should also be provided in high schools. Sometimes the student could be sent to the high-school library. The main point of this paragraph is that all the supplementary assignments should be definitely planned, and, if possible, mimeographed outlines prepared so that a student's assignment could be given to him in a moment by brief reference to the outline. Much of this assigning could be done while the class is assembling. In some cases supplementary assignments for a week could be outlined in a five-minute conference with the student.

3. *Excuse individuals to work at desks or in library or laboratory.*—If the classroom is of ordinary fair size, students who are excused from participation in the recitation can work at the back of the room without any serious loss of time. If

the teacher establishes the right general spirit of work, all students will form such habits of application and of disregard of distracting conditions as were described above on page 359. In some cases students who are excused from participation in the recitation could be permitted to work in the library or in a laboratory with perfect assurance that they would use their time seriously and profitably.

Examples of successful use of the method.—A description of a method of conducting algebra classes along lines somewhat similar to those described above is found in a pamphlet entitled "The Laboratory Method in Teaching Mathematics," by Hornbrook (**3**). I have seen the method used in classes in German where the class work consisted of reading or translating selections that had been studied at home. In each class two or three of the brighter students were excused two periods a week on the average and given long reading assignments in other German books. These they read and prepared in the form of epitomes or selected narratives, which they told in German to the class from time to time. The ordinary class in foreign language, when conducted by the translation method, furnishes perhaps the best argument for such variations as we have been describing, since the class time is very commonly wasted for the brighter pupils who have prepared their translations conscientiously at home or during study periods.

4. **Required supervised study periods supplementary to recitation periods: the Batavia scheme.** — Up to this point in the chapter we have considered three types of experiments in varying class instruction so as to provide for individual differences in capacity; namely, the Pueblo plan of individual instruction, the monitorial sectional plan, and the plan of providing supplementary assignments for the brighter students instead of requiring them to participate in all recitations. The fourth scheme for securing individual instruction does so by having regular supervised study periods for all

subjects in place of part of the time usually given to recitations. During these periods the teacher gives attention to the progress of individual students, skillfully aiding the slow ones by questions or suggestions, and providing supplementary assignments for the rapid workers. This is known as the Batavia plan, owing to its successful use and propagation by John Kennedy, Superintendent of Schools in Batavia, New York. From the standpoint of provisions for individual differences it varies from the Pueblo plan in that the class progresses as a whole. It could be combined with the three-section monitorial scheme by requiring a part of the time spent by each section in the classroom to be devoted to supervised study. If administered to the best advantage, it should include the plan of minimum essentials for the slow students and supplementary assignments for the bright students described on pages 384–387. Inasmuch as the introduction of required periods for supervised study in school is one of the most important reforms demanded at the present time, and as the proper organization of such supervised study involves a special technique, we shall devote a special chapter to this topic.

In addition to the schemes for varying *class instruction* so as to provide for individual differences in capacity, there are numerous *administrative* arrangements in the form of special schools or special classes. To find accounts of these provisions, the reader should examine the *Proceedings of the National Education Association* from 1909 to the present time.

Conclusion of discussion of adapting instruction to individual differences. — This will conclude our discussion of the adaptation of class instruction to differences in capacity. On the historical side we noted that individual instruction prevailed for a long time but in cities was almost completely displaced during the nineteenth century by the method of simultaneous class instruction. The latter method involves enormous waste of time for both the especially slow and the especially bright students. This was pointed out by a few educational leaders at the end of the nineteenth century, but little sentiment was aroused in favor of adequate variations in instruction to suit varying capacities until statistical proof of the differences in capacity and the amount of waste in the ordinary class was presented by Thorndike and others. There is now a general interest in avoiding this waste, and various types of schemes to combine class instruction with variations to meet the needs of individuals are being tried. Three of these were discussed in this chapter, and another, namely, supervised study, will be described in the next chapter.

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EXERCISES

For problems for class discussion of the closely related topics, "Differences in Capacity" and "Supervised Study," see *Exercises for "Methods of Teaching in High Schools,"* pp. E 190–E 215. These pages include new data on reading rates of high-school pupils, problems for graphing, a stenographic report of a supervised-study lesson, and directions for a special term paper entitled, "I shall try to apply the following ideas in my teaching."

CHAPTER XVI

SUPERVISED STUDY

Main points of the chapter. — 1. The supervision of poor students who are studying silently at their desks should replace part of the time which they commonly spend in recitations and home study.

2. Poor students especially fail to profit under the system of recitations based upon home study.

3. Precisely measured, experimental investigations show that supervised study improves the work of poor students.

4. Divided periods, part for recitation and part for supervised study, should be arranged as regular parts of the daily programs for such students in certain high-school subjects.

5. Conditions favorable to study are those favorable to concentration of attention.

a. Physical conditions and certain routine habits may be easily improved.

b. Spontaneous interest and concentrated thinking are more difficult to secure but are essential.

6. A special technique of supervising study should be mastered by teachers. It should include

a. Skill in determining the character of the progress being made by students while they are studying.

b. Skill in stimulating and aiding this progress by means of questions and suggestions without assisting too much.

Supervised study should partially replace recitations and home study. — Organized periods for supervised study of poor pupils should replace a part of the time commonly spent on recitations in school and studying at home. This reform and the arrangements for adapting instruction to differences in capacity are two of the reforms most needed to increase the efficiency of classroom instruction. As indicated at the end of the preceding chapter, the two reforms are intimately related, since supervised-study periods furnish one of the best opportunities for varying assignments and giving instruction to individual pupils. By *supervised study*, as used throughout this chapter, is meant the supervision of individual pupils who are studying silently at their desks, not the supervision of a discussion by the class of a new assignment, which in recent years has been designated as the study lesson.

Three elements in efficient instructions: varied assignments, supervised study, group recitations. — Historically we have interesting developments in connection with studying, just as we have in the case of provisions for individual instruction. Originally pupils studied individual assignments, unsupervised, at their desks, and recited as individuals to the teacher at his desk. This system was replaced by the class method, in which the students studied class assignments, either at home or during practically unsupervised study periods in school, and recited afterwards as a class. The plan proposed here includes the three following elements: (1) Similar assignments (which vary in intensiveness) to all members of the same class or section of a class, thus providing for some uniformity and some variation; (2) supervision of poor pupils of the group which is studying, by the teacher who passes around the room giving suggestions to individuals and asking each one such questions as may seem desirable; (3) group recitations either of the class as a whole or in sections. This chapter is concerned only with the second of these elements; namely, supervised study.

Strong social demands to substitute supervised study for home study. — Until recently the almost universal practice in American high schools included class recitations based upon home study or upon infrequent, almost wholly unsupervised study periods. For some time, however, vigorous attacks have been made on the home-study part of this practice, and many schools are now operating on the basis of regularly organized, frequent, carefully supervised study periods with little or no home study. One of the most impressive discussions of this situation appeared in the *Ladies' Home Journal* for January, 1913. The article included letters from successful school superintendents and principals all over the country, condemning the ordinary practice of expecting most students to get their lessons at home without assistance, and giving examples of reforms that had been successfully carried out in various places. The article contained an editorial suggestion to parents to go on a strike and refuse to have any further studying done at home by their children.

One contributor reported the following incident which bore the headline, "The widow who was dead right" :

> A widow came to the superintendent of schools with the following complaint: "I have four little girls attending your schools. I am up at five o'clock in the morning to get them off to school and to get myself off to work. It is six o'clock in the evening when I reach home again, pretty well worn out, and after we have had dinner and have tidied up the house a bit, it is eight o'clock. Then, tired as I am, I sit down and teach the little girls the lessons your teachers will hear them say over on the following day. Now, if it is all the same to you, it would be a great help and favor to me if you will have your teachers teach the lessons during the day, and then all I would have to do at night would be to hear them say them over."

Teachers fail to appreciate students' difficulties in studying. — Some teachers overlook altogether the fact that many students have great difficulty in mastering their lessons unaided. This may be due to the fact that these teachers were fairly bright students when in high school; or they may have forgotten their own difficulties and are not in a situation where they observe mediocre or poor students studying at home. Even quite bright students sometimes have difficulties in getting their lessons, particularly in the first year of high school. For example, the honor graduate of a fairly large high school reported that during her first year in high school she nearly always sought assistance from her former eighth-grade teacher, and she would have continued to do so later, but the lessons were too difficult for the teacher.

Even careful assignments do not always aid poor students. — The general situation is illustrated further by Breslich, who says:

> It is true that the better teachers give careful suggestions with each assignment as to method of attack, aim, and meaning of the assignment. Usually this enables the better pupil to do the work without undue difficulty, but it does not help the slow pupil who fails to make the connection between the assignment and the suggestions given by the teacher.
>
> That in beginning classes of the high school suggestions given with the lesson are not sufficient to enable the pupil to do his work, and that the pupil's difficulty in studying his lesson is much greater than is usually assumed, is illustrated by the following occurrence: The parents of a pupil just beginning first-year mathematics in the University of Chicago High School complained to the teacher that the daughter came home day after day with home work assigned but with no idea how to do it. The girl had told them it was the teacher's custom to assign problems with no suggestions. Feeling that this procedure was unreasonable, the parents spent the evening hours working the problems and explaining them to the child. When they were unable themselves to do the work, they called on a ministerial friend living in the next block, who was good in mathematics and kind enough to help. Finally the parents came to the teacher and complained: "Sometimes even all of us cannot do the work you assign; how do you expect her to do it alone?" The teacher was surprised to learn that, after all the careful preparation in the classroom, a pupil, no matter how slow, should not even know that suggestions were given. Asked whether any suggestions for the next day's lesson were given, the girl said she knew of none. To satisfy the parents, the teacher took a quarter of an hour to go over the preparation of the lesson with the parents and daughter exactly as had been done in the classroom. It was found that the

girl remembered it all but failed to see how it would help her to study her lesson. It was now the parents' turn to be surprised. They went away feeling that the child, not the teacher, was at fault. But this experience shows clearly that the teacher's method of instruction did not accomplish the desired results, for at any rate this pupil had failed to make the connection between suggestions and assignment. (**1**: 44–45; **2**: 505)

Home environment often interferes with studying. — If such results are found in high-grade homes, with plenty of room and furniture, good light, and parents who have sufficient leisure and interest to concern themselves about the lessons of their children, it is obvious that worse results might be expected from less favored homes where the conditions for studying are often very poor. That this contrast is not a matter of theory but is an actual condition is shown by an investigation made by W. C. Reavis and entitled "Factors that Determine the Habits of Study of Grade Pupils." (**8**: 71–81.) In reporting the results of the investigation the author says:

> The investigation covered the home conditions of three hundred and ninety-three children. Data about these homes were gathered and graded according to the following points: Educational interest on the part of the parents; means to provide adequate food, clothing, medical attention, books, papers, magazines, and entertainment; moral atmosphere that would encourage honesty, earnest effort, regard for the rights of others, and a due measure of self-respect. The homes were divided into three equal [groups] and designated as ranks I, II, and III.

The pupils also were classified, from the standpoint of habits of study, into three grades, or qualities. Then the pupils from homes of different ranks were compared from the standpoint of their habits of study, and the following table was secured. The percentages are calculated on the vertical distribution, hence the columns should be read vertically.

	I. Students from Homes of First Rank	II. Students from Homes of Second Rank	III. Students from Homes of Third Rank
Students having habits of study of first, or best, quality . . .	75%	32.4%	15.3%
Students having habits of study of second quality	19.7%	48.2%	40.7%
Students having habits of study of third, or poorest, quality . .	5.3%	19.4%	44%
Total	100%	100%	100%

This table shows clearly that students from the less favored homes have the poorer habits of study. Furthermore, the students from the less favored homes tend to neglect the preparation of their lessons at home more than do those from the better class of homes, as shown by Reavis in the following table. The percentages are calculated on the horizontal distribution, hence the columns should be read horizontally.

	I. From Homes of First Rank	II. From Homes of Second Rank	III. From Homes of Third Rank
Distribution of students doing assigned home study	38.5%	54.2%	7.3%
Distribution of students *not* doing assigned home study . . .	4.1%	43.8%	52.1%

Discursive influences even in favored homes. — Even when the home environments are of fairly good grade, and the students able to master the lessons unaided, the activity of studying must compete with many other tendencies and with distractions that result in divided attention and consequent waste of time and energy.

The conditions for home study present all the possible variations, but most home study must be done under discursive influences—a little study, a little conversation about irrelevant matter, an intermittent discontinuance for small household duties, a prolonged intermission for recreation, with the half-consciousness of wrongdoing because of unfinished and overhanging lessons, even interrupted sleep because of a number of unfinished tasks, a final effort to secure categorically such facts regarding the assignment as are essential to enable the pupil to meet the teacher, a consciousness of incompleteness of preparation and a hope that, if called upon at all, the call may come for the facts that are in the pupil's meager store. (**3** : 245)

Measured results show influence of supervised study. — To determine by exact measurement the relative efficiency of the home-study system and supervised study in school, Breslich conducted an experiment in teaching algebra to two parallel classes of approximately equal ability. In one class he abolished home study altogether but used part of the recitation period for supervised study. The other class had home study and used the class period for ordinary recitation purposes. The classes may be distinguished by designating the former as the supervised-study class and the latter as the home-study class. The supervised-study class spent only the regular class period upon each lesson, namely, forty-five minutes; it had no outside study. The home-study class spent on the average two hours, or one hundred and twenty minutes, on each lesson. This was composed of forty-five minutes of class recitation and an average of seventy-five minutes of home study. Thus the home-study class devoted on the average two and one half times as much time to each lesson as the supervised-study class did. In spite of this enormous difference in the amount of time spent by the two classes, the supervised-study class averaged as well in the examination on the chapter covered in the experiment as did the home-study class.

The details of Breslich's experiment, as well as the accompanying discussion, should be studied by all readers in the *School Review* for October, 1912. The following additional points may be given here. The equal ability of the two classes was shown by their grades in the examination at the end of the preceding semester. The average of these grades for the supervised-study class was 79.4; for the home-study class it was 81.4; and the distribution of A's, B's, etc. was approximately the same. The experiment included fourteen lessons on the chapter on simultaneous linear equations. The grades made in the examination on the chapter are shown in the following table:

	A	B	C	D	F	AVERAGE
Supervised-study section. No home work	0%	6.2%	37.5%	25%	31.2%	65.5%
Home-work section. No supervised study	7.1%	21.4%	21.4%	0%	50%	62.8%

Thus it will be seen that, although slightly inferior according to the preceding semester averages, the supervised-study class was able to do slightly better on the average in the experiment than did the home-study class which put in two and one half times as much time.

Poor students profit from supervised study, good students from home study. — Although the supervised-study class did as well on the average, nevertheless the brighter students in the home-study class did much better than the brighter students in the supervised-study class. This is shown by the fact that only 6.2 per cent of A's and B's were made by the students in the supervised-study class as compared with 28.5 per cent of A's and B's made by the student's in the home-study class. These facts show that the capable students profited from unsupervised study and, as a result of the added time spent in home study, mastered more thoroughly the type of problems that were being studied. On the other hand, the fact that the averages of the two classes were practically the same in the experiment is explained by the fact that 50 per cent of the home-study class received below D, while only 31.2 per cent of the supervised study class received below D. This shows either that poor students profit very little by unsupervised study or that they neglect to do their home study. Probably both factors enter in.

Poor students often fail to do home study. — Some light is thrown on the influence of these two factors by the figures given by Reavis for a first-year Latin class. (**7**: 398–405.) In its habits of study this class would be quite similar to Breslich's classes. Reavis secured statements showing the average amount of time spent in home study by each student, and compared these with the term grades of the students in Latin. The grading system in use included the letters A+, A, B+, B, C+, C, and X. C meant "conditioned" and X meant "failure." The following chart shows the relation between the amount of home study and rank in this class.

Chart showing Grades made by Students who spent Various Amounts of Time on Home Study

	X					
	X	C				
	X	C+	B	C+		
	X	C+	B	B		
	X	C+	B	B+		
	C	B	B+	A	C	
	C+	B+	B+	A	C	
	A	B+	A	A+	B	
	A+	A+	A+	A+	B+	
	A+	A+	A+	A+	B+	C+
Hours spent on home study	0	½	1	1½	2	2½

The first column shows the term grades of the students who put in no time on home study. It may be read as follows: Of the ten students who put in no time on home study five were failures (grade = X), one was conditioned (grade = C), one barely passed (grade = C +), and three made excellent records (grades = A + and A), but according to Reavis these three were repeating the course. These facts suggest that the large number of failures in Breslich's home-study class was partly due to the lack of study. On the other hand, the right-hand side of Reavis's table shows that students may put in considerable time on home study and still do poor work; for example, the one student who put in two and a half hours barely passed (grade = C +), and two students who put in two hours were conditioned (grade = C).

Elaborate investigation in fourteen high schools. — The most elaborate experimental investigation of the influence of supervised study upon the attainments of pupils was reported by F. S. Breed in the *School Review* for March and April, 1919, Vol. XXVII, pp. 186–204 and 262–284. Results from thirty-four classes in three subjects (algebra, Latin, and English) were compared for (1) work conducted under the divided-period plan with supervised study, and (2) work done without supervised study. As in the case of Breslich's experiment, measurements showed that the progress of the poor pupils was greatly facilitated by the supervised study, but that the progress of the better pupils seemed to be retarded by the type of supervised study which prevailed in the experiment.

Although further measurements are needed to determine the exact nature of the influence of supervised study, the results to date indicate that in the case of the poor students better results are achieved by a combination of supervised study and recitations than by the common system of recitations based on unsupervised study at home or in school.

Introduce supervised study gradually in order to master its technique. — Supervised study has been introduced into high schools in varying degrees. As a mild beginning, study periods after school hours are sometimes offered by conscientious teachers, and attendance invited but not required. Such a period usually does good as far as it reaches the pupils. Sometimes it is made more influential by requiring those students to attend who are falling behind in their lessons or making poor records. Sometimes one regular period a week in each subject is made a supervised-study period. All of these are steps in the right direction and probably constitute the best method of introducing supervised study in order that teachers may gradually learn something about its possibilities and the technique of conducting it, for a special technique is needed and will be discussed later in the chapter.

Best form is the Batavia plan of required periods. — After some preliminary experimenting has been carried out in any system or school with supervised study, however, it should be used for all poor pupils, and the best way of doing this in high school is to adopt some modified form of the Batavia plan. As noted in the preceding chapter, the essential idea in the Batavia scheme is the placing of a number of required supervised-study periods in the daily program and requiring the teacher to use them for directing pupils who are studying silently at their desks. This scheme was organized by Superintendent J. Kennedy in Batavia, New York, about 1898. At first it was simply a device to enable the school system to use some very large rooms in certain elementary schools by filling them with children and putting two teachers in a room, one to hear recitations and the other to supervise the children who were studying. The results were so gratifying in bringing the backward children up to grade and almost entirely eliminating failures that the plan was extended to apply to rooms that had only one teacher. This was accomplished simply by making supervised study a regular part of the daily program. In the *Elementary School Teacher* for June, 1912, Mr. Kennedy describes the very favorable results of fourteen years' experience with the plan.

Divided periods provide for required supervised study in high schools. — A simple way of adapting the Batavia plan to high-school instruction is to introduce divided periods and require every teacher in the subjects in which recitations are ordinarily conducted to use a certain part of each period for supervised study. It is necessary to make this a requirement, because many teachers will use the whole period for recitation purposes unless the supervised study is required.

How secure supervised study merely for slow pupils? — However, if supervised study is helpful only for *poor* pupils (as suggested by investigations described above), it would seem that these pupils ought to be segregated for such work in order to avoid retarding the brighter ones. Breed specifically suggests "some selective or differential plan of study supervision" for this purpose. An elaborate descriptive, statistical, and argumentative account of an actual experiment in placing bright, mediocre, and slow pupils in separate classes is described by F. E. Clerk, in the *School Review* for January, 1917, Vol. XXV, pp. 26–47. The experience of The University of Chicago High School with supervised study is described by G. L. Harris in the *School Review* for September, 1918, Vol. XXVI, pp. 490–510. This school now (1920) has some rapidly advancing sections of bright pupils with special arrangements for supervised study of the slow ones.

Special technique of supervising study. *Avoid extremes of too much assistance and of vague exhortation.* — As stated above, a special technique of supervising study needs to be understood and used by teachers if the results are to be satisfactory. The chief danger to be avoided is that of assisting pupils too much, thus doing their work for them instead of arranging conditions so that they will do it. At the opposite extreme is the tendency to talk learnedly about concentration of attention, and to expect to secure this desirable condition on the part of the students by demanding it of them. But, as we noted above (page 342), the endeavor to secure concentration by a mere "heave of the will" is relatively ineffective, since, at the outset, it usually establishes merely a condition of divided attention that is relatively unfavorable to studying. What is needed is a clear understanding of the conditions upon which favorable attitudes of concentration of attention depend, and intelligent endeavor by teachers to establish these conditions. Hence, in taking up the discussion of the technique of supervised study we shall relate it to the conditions determining the concentration of attention.

PUPIL'S STUDY PROGRAM

Name..*Grade*..

HOUR	STUDY	RECITE
9.00		
9.45		
10.30		
11.10		
1.15		
2.00		
2.45		
3.20		
		(Over)

Physical conditions should suggest study. *A study-program card improves studying.* — The influence of physical conditions in determining concentration of attention is the first point that we shall consider. By physical conditions we mean all kinds of routine mechanical arrangements that can be made in order to put students in a situation in which all of the suggestions are in the direction of concentration of attention along the desired lines. The grade teacher's orders to "put everything away" is the most obvious endeavor to eliminate conditions which suggest attention in undesirable directions. In general, the suggestions of the physical situation in school ought to be much more favorable to study than those of the home situation. The suggestions of the school situation can be greatly strengthened, however, if the teacher makes it a point to do so. This is illustrated by Reavis's experiment with cards upon which each student made out a definite program of study for the term. The form of one side of the card is shown on page 403. (**7**: 400.) The student indicated the subject that he was to study at each period that he was in the study room. "Duplicate copies were placed on file in the assembly-room desk, so that the teacher in charge could closely supervise the work." Reavis records the influence of the study-program card in the following statement:

> During the two and a half years that study has been closely supervised and regular programs for each pupil strictly followed, three things have been accomplished with more or less success: (1) the problem of discipline has been practically solved; (2) considerable improvement has been made in scholarship; (3) regular hours of home study have been provided for by the large majority of the students. (**7**: 399)

Reavis gives measured evidence for these statements. To be sure, these results are only partially due to the influence of the card as an improvement in the physical situation, but its influence in this way is very important. That is, once the program card is made out, it becomes just as much a part of the physical situation as the clock or the bell or the teacher, and it operates more or less mechanically as a source of suggestions for concentrating attention.

Students testify to influence of card in improving study. — As evidence of the value of the study cards Reavis gives the following testimony from students who used them for two and a half years.

1. By following a definite program of study I have formed the habit of studying a certain lesson at a certain time, and because I know that I must study at that time I am always ready.

2. If a definite program is followed, I can do more and better work than if I study in a haphazard fashion.

3. When following a study program one is never in doubt about what to do next.

4. A study program keeps me from spending too much time on favorite subjects.

5. By following a regular program I waste no time in thinking about what I shall do next. Then, too, it keeps me from changing tasks when I begin to tire of what I am doing.

6. By preparing my work regularly I find that I not only have better lessons but also have more time for leisure.

7. The study program has proved so beneficial to me in the preparation of my lessons that I now follow a regular program for all of my work.

8. I find that by following a regular program of study I always study each lesson, whether I accomplish anything or not. At least I always know something about each lesson.

9. I had the habit of always putting off my work until I felt just right for study, and as a result made very poor grades, but since I have adopted a regular study program my interest in my work has greatly increased and I am no longer ashamed of my grades. (**7**: 404–405)

Thus we see that a study program may be one of the most important aspects of the physical situation, serving as a source of suggestions for the concentration of attention in the right direction at stated periods.

Form habits of going through the motions of studying. — A second general class of conditions determining concentration of attention includes certain more or less mechanical habitual processes which the student may develop. They involve "going through the motions" of giving attention or getting ready to give attention. An example has already been given (on page 358) of the way students settle down to work under different teachers. Improvements in habits of study may be made along this line. The need of them is shown by Breslich's statement of the conditions observed at one stage of his investigation after the experience with the girl who did n't understand suggestions, as described on page 394. Breslich says:

> To ascertain to what extent the other members of the class might have this difficulty, the following experiment was tried: In assigning the next lesson, suggestions were given with unusual care. The pupils were then told that the next fifteen minutes would be given to studying the lesson, and that they should begin the assigned home work immediately. The experiment showed at once that the pupils did not appreciate the value of limited time, for all were slow in beginning work. It took some of them the whole fifteen minutes to go through the technique of getting started. Several evidently were not in the habit of working alone, for they looked about helplessly and simply imitated the others. However, these same pupils had come to the classroom daily with the lessons well prepared. Very little was accomplished in the fifteen minutes, indicating that the pupils very probably wasted much time in studying their assignments of home work. Although the class had been in the high school only a short time, the teacher had been presupposing a habit of study which did not exist. Much of the difficulty is due to lack of knowledge as to how to study and how to use time to advantage. The remedy in this case is, of course, definite instruction as to methods of study. (**1**: 45, **2**: 506)

Example of an individual making his own surroundings favorable. — Students can easily be trained to go through the motions of getting ready to study. Either in school or at home they can be taught to apply the idea of putting distracting objects out of sight and arranging materials for the present task. This habit in the student corresponds to the teacher's activity in arranging the physical situation. Many adults apply this principle of "going through the motions" by arranging favorable physical situations in their own work.

Thus, when I was "deaning," much of my work was carried on under conditions that involved rapid shifting of attention; for example, during a conference with a student I often had to answer the telephone two or three times, give directions to clerks who came in with questions, and perhaps make memoranda on another case which flitted through my mind while the student was trying to choose between certain alternatives which we had been discussing. Obviously, such a situation was not favorable to prolonged economical attention to one matter; hence, if I had some long statistical calculations to make, or was puzzling out the organization of the work in a department, or working out the program for a faculty meeting, I always went to another room and used a desk on which there was no other work of my own and where I would probably not be approached about other matters. Similarly, at home my regular desk is piled with distracting material related to the teaching of my classes. Consequently, when I want to write on a chapter or article with greatest economy of attention, I commonly use the dining-room table or any other table that I can get. Upon it are piled only materials that are conducive to attention to the work in hand. Moreover, it is possible to acquire ideas or habits of arranging these in detail so as to make for economy in attention. For example, sources that are to be consulted may be piled in the order in which they are to be used; a used page of the outline which is being followed may be put at the bottom of the pile of outline pages; finished pages of the manuscript may be piled so that they will be in order (this usually involves putting them face downward but placing the last finished sheet so that it can be referred back to at a glance).

Outlining is a useful form of going through the motions. — The practice of making an outline on paper is another habit of going through the motions that helps in securing attention in studying. For example, in beginning this chapter about half past seven one evening I was possessed with the idea of going to a neighboring minstrel show. I could n't get the thoughts of the singing and eccentric dancing permanently out of my mind. But I also wanted to get to work on the chapter. So, at a favorable moment, when the thought "write the chapter" was dominant, I started to make the appropriate motions by jotting down some headings in the outline. The thought "go to the show" kept coming back, but the outlining motions helped to inhibit it. Suddenly it occurred to me to look at my watch, and it was nine o'clock, too late to go, and I had made considerable progress in thinking out the chapter. Similarly, students will find that the outlining of assigned readings will serve as an important mechanical aid to attention. Its utility from the standpoint of clear thinking will be referred to later.

Form habits of disregarding routine distractions.—Another idea or habit that can be acquired, and that is more or less mechanical in its operation, is that of disregarding distractions, as discussed above on page 359. The specific reactions of "keeping the eyes on the book," "finishing this sentence before looking up," etc. can be consciously practiced at first and later become more or less automatic. They will probably not work when perfectly novel distracting stimuli appear, but they will help in a great many cases, since the distracting conditions tend to fall into certain classes, such as "boy sharpening a pencil," "ruler falling on the floor," "boy wanting to borrow some paper," "teacher pushing back his chair," "teacher opening a window," "teacher reproving inattentive pupil," etc. Ideas and habits of disregarding each class of distractions can easily be acquired. To be sure, the distracting stimulus may be noticed, thus producing divided attention for a moment, but the retention of the physical attitude of attention to the work in hand almost immediately shuts out the distraction. In some classes, as noted above, routine distracting conditions do not even produce divided attention; they pass entirely unnoticed.

Thus we see that "learning how to study" and "forming habits of study" may be aided by certain purely mechanical arrangements and routine habits, such as a study program and habits of "going through the motions" of studying. These devices are helpful in studying because they are helpful in directing attention to the work in hand.

Concentrated studying, however, must be secured through interest. — But effective studying involves more than merely "going through the motions"; it involves also concentration of attention upon the contents of the material to be studied. The general basis of such concentration was shown, in Chapter XIV, to be certain instinctive or habitual interests. We need to know how the instincts of mental activity, curiosity, collecting, manipulation, communication, and coöperation can be made effective during silent study. The discussion of the general application of these, given on pages 344–358, will probably suffice to suggest their specific application to studying. The same may be said about the habitual interests discussed on pages 358–361.

Review conditions favorable to learning discussed in preceding chapters. — There are also certain specific bases for interest or concentration of attention in connection with each type of learning, and consequently in connection with studying or practicing along each line. These have been discussed to a certain extent in the chapters on learning; hence it would serve as a useful review for the reader to read over again from the present standpoint the material presented there. For example, secure an answer to the question, What are the mental conditions favorable to concentration of attention in motor practice and in memorizing, and how are these conditions best secured during periods of individual practice or study? The same question should be answered for reflective thinking, for habits of enjoyment, and for expression. The answers can be worked out on the basis of the chapters upon learning, self-activity, apperception, and interests.

Scan assignments to find points of interest. — Special note may be made of the following points: A helpful device in some cases is the practice of skimming, or scanning, new assignments in order to run across some point that secures spontaneous interest. If a book or chapter is well constructed, the first part should be the most important part to attack first in order to *understand* it; but there is a difference between securing understanding and securing spontaneous attention. An interesting illustration with which an author would not think of beginning his chapter might be found on the third page and arouse spontaneous interest in the related discussion. Sometimes the opening paragraphs are so poorly written, owing to the difficulty that the author has experienced in getting the swing in his writing, that they are the most uninteresting and unattractive parts of the discussion. This fact is illustrated by the following example given by Adams.

> An experienced editor, in engaging a brilliant young man to assist him in preparing for the press manuscripts that had been accepted for his magazine, gave this advice: "In many cases, particularly with essays, you will find it a good plan to cut out the first paragraph. The author gets down to business in the second. You will, of course, be prepared to have all the authors complain that the first paragraph is the best in the essay, the fact being that they have given so much time and care to the beginning that they have lost all sense of its true value." (**10**: 178)

Hence, as a device to assist him in getting interested in studying some assignments, the student may wisely omit the introduction until it becomes of interest in relation to later material which has aroused spontaneous interest.

Outline is an aid to reflective mastery of an assignment. — Another point that may be reviewed here for emphasis is the making of outlines, or briefs, of assignments that are being studied in various content subjects. This practice has already been mentioned on page 407 as a mechanical aid to attention. It was also discussed at length on pages 280–281 as the basis of clear thinking preparatory to expression. It serves a similar purpose in securing a reflective analysis and clear understanding of an assignment that is being read. If such assignments are to be recited upon, the outline, or brief, serves the double purpose of being an aid in studying and an aid in expression.

Principles of chapter on reflective thinking given special application. — Finally, special attention may be called to the discussion in the chapter on reflective thinking (pp. 171, 203), where the point was made that books may be so constructed as to require and stimulate reasoning. In applying the principles of reflective thinking to the study of assignments in books, teachers should make it clear to students that it is this reflective mastery, and not merely verbal memorizing, that is desired.

Routinized directions to students to assist in studying. — A practical illustration of how some of these points may be brought to the attention of students in a routine way is found in the directions printed upon Reavis's study-program card, which was described in part above on page 403. These directions, which appear on the back of each student's card, are given below with a slight change in the numbering.

DIRECTIONS FOR STUDY

1. Follow your program regularly.

2. If possible, study your lesson immediately after the assignment is made.

3. Take brief notes and afterwards restudy by outline.

4. Use dictionary and reference books for points not clearly comprehended.

5. Concentrate your mind so that outside interests will not frequently disturb your study.

6. Do not try to commit exact words until you understand their content.

7. Connect the important facts of the new lesson with facts previously learned.

8. Make comparisons and contrasts when possible.

9. Carefully review and think over the previous lesson before beginning the next.

10. The extra effort spent on preparation pays the greatest intellectual dividends. (**7**: 400)

Special technique to be used by teacher in supervision. — The final point to be considered in connection with supervised study is the technique to be used by the teacher while passing around the room and giving suggestion to or asking questions of individual pupils.

Must get insight into pupil's thinking; objective evidence desirable. — In order that the teacher may be able to suggest and question intelligently, it is necessary for him to be able to get some notion of the thinking which the student is doing or has been doing. This is easily done in mathematics, since the student puts the operations down on paper to a considerable extent; hence the teacher can usually tell at a glance what progress or mistakes he is making. In some other subjects there are definite exercises to be worked, resulting in objective answers, as in grammatical work in a foreign language, and in problems in physics and chemistry. In the writing of the briefs of compositions the teacher can also get some idea of the pupil's progress by the objective results he has produced. In some other subjects, however, such as history, it would be necessary to make special provision for such objective products of studying. As a step in this direction, G. E. Rickard, who has been investigating the problem of organizing supervised study in history, summarizes the specific aims of history instruction as follows:

A. *To develop the pupil's ability to answer questions based on*

1. Acquisition of the proper concepts of new and technical terms.
2. Mastery of the subject matter of the text.
3. Interpretation of source material.

4. Abstracting collateral reading and connecting it with the outline of the text.

B. *To develop the pupil's ability to act by*

1. Arranging logical outlines and abstracts of the subject matter of the text.

2. Arranging tabulations of time sequences of events and persons, grouped according to some convenient unit, as decades or centuries.

3. Drawing maps which shall more or less closely approximate some ideal which the instructor has previously analyzed into its elements.

4. Collecting material on a given topic, organizing it logically, citing references, and preparing bibliographies.

Such a definite tabulation of the specific aims to be achieved in the studying of a subject like history is the first step in the direction of getting some objective basis for determining the progress that the student is making while he is studying. Obviously, many of the aims cited above involve definite objective results in the form of maps or outlines, while others, such as the interpretation of sources, might easily be made to involve the writing of brief answers to definite questions, if the assignments are as definitely and skillfully worked out as those cited above on pages 174–176.

Sometimes, if the teacher cannot determine what progress the student is making by simply looking over the latter's shoulder, he can ask the student questions that will serve the purpose. Moreover, if properly restricted, students may be permitted to ask questions in order to clear up difficulties.

Skilled questioning to avoid assisting too much. — After the teacher has determined what progress the student is making, the next point is to devise questions and suggestions which, without assisting him too much, will keep him thinking and progressing. This requires the finest art on the part of the teacher and is the point at which many fail in conducting supervised study and in other kinds of teaching as well. The teacher should not only endeavor to avoid too much direct assistance, but must also avoid the opposite practice; namely, long-winded, roundabout, Socratic questioning. At first an inexperienced teacher will have great difficulty in achieving a success in the type of supervision suggested here, but as he becomes well informed concerning the specific difficulties encountered by students in specific types of problems and other assignments, and as he gains some skill in questioning, he will be able to see at a glance what the student's difficulties are and, by one or two well-worded questions, to start him thinking in the right direction.

Sometimes during the period of supervised study a brief period of class discussion of difficulties may be desirable. Hence Breslich says:

> It becomes evident frequently that a great many pupils make the same mistake or encounter the same difficulty. This may indicate either that the mistake is a fundamental one — one that cannot be avoided under the best method of instruction — or that the instruction was not as efficient as had been supposed by the teacher. Very often the teacher learns that he has not realized how different his method of presentation is from the method of study of the pupils. In such cases the class is asked to stop working. The mistake or difficulty is thoroughly discussed, and work is then resumed where it was left off. (**2**: 514)

Examples of large improvement from slight assistance. — The favorable results of such suggestions in aiding students who are having difficulties is illustrated by Breslich's account of the work of three students in his supervised-study class. He says:

> The section under supervision worked with more confidence and pleasure. This was especially true of the slow pupils. A girl who had failed during the first semester and was in the class on condition made a grade of 78 in the test on this chapter. Her grade in the final examination at the end of the first semester had been only 40. A boy who barely received a passing grade at the end of the first semester, and who at first seemed to be unable to do

anything under supervision, suddenly found that with a little greater effort he could do as well as his classmates. There was an immediate improvement, and one day, when a speed test was given, he surprised everybody, even himself, by leading the class. A girl returning after a week's illness, and still in a weakened condition, said she "could not understand anything that was said," and felt greatly discouraged. By giving her a little more attention than the other pupils she was enabled to do the work before the end of the recitation, and had no further difficulty. Under the common system of instruction very little attention is paid to such cases. The teacher usually allows a certain amount of time in which the pupil must "catch up." Very often, in addition to the difficulties found in understanding the class work, "back work" is assigned. The injustice of all this at times drives some pupils to use dishonest means of getting possession of this required work. (**1**: 63, **2**: 510)

The suggestions need not be restricted to intellectual difficulties, but may relate to improvement in the form of the work, neatness, more economical methods of procedure, etc. In the case of bright students who readily complete the work required of all, supplementary assignments can be made when needed; that is, if they have not already been made for an extended period or in the general assignment.

Supervised study on new topic should precede home study. — An important rule laid down by Breslich is that assignments of work on a new topic should always be made in such a way as to enable pupils to spend some time studying the topic in school under supervision before having assigned home work. Concerning the relation of this practice to home work he says:

Teachers should take a new attitude toward home work. They should break themselves of the habit of prescribing the regulation amount of home work daily. Pupils cannot be expected to prepare lessons well unless they know definitely what is expected of them. Rather than assign a lesson of doubtful difficulty and receive lessons poorly and dishonestly prepared, they may omit the home assignment altogether. Home work should have the character of completing the class work of the previous day, not of preparing for the next. This will enable even the slow pupil to apply his time to it with success and profit. Let the pupil struggle with really new work under the supervision of the teacher, but let home work be preceded by enough similar work in the classroom to furnish a pupil a clew to prevent his working in the dark. With this new rôle assigned to home work a change in class methods should follow.

The time ordinarily used for recitation should be shortened or omitted altogether. The time gained can then be used for supervised study and for the development of new work. (**1**: 70)

General spirit of school improved by supervised study. — Finally it may be noted that the system of supervised study introduces a much better general spirit for both pupils and teacher than is secured by the ordinary plan of recitations based on home study. As suggested in the beginning of the chapter, upon the latter plan the teacher is primarily a detective at work to determine how well students have performed, out of school, tasks which have been assigned them. Upon the supervised-study basis the teacher is primarily one who assists students in school to make progress in their studies. Nearly all the articles referred to in the bibliography at the end of the chapter give testimony to large improvement in discipline and decrease in nervous strain and fatigue as results of the introduction of supervised study on a large scale.

Conclusion of discussion of supervised study. — This will conclude our chapter upon one of the most important reforms in instruction that is taking place at the present time. We showed that the introduction of supervised study on a large scale is necessary to avoid the large waste of time, energy, and community money that commonly results from the poor or unfortunate students' failing to carry on effective study at home. Experimental investigations were reported which show that poor students learn much more effectively under supervised study. The conditions favorable to study were discussed and shown to consist of certain physical conditions and routine habits which may easily be provided, plus arrangements to secure spontaneous interest and concentrated attentive thinking. The latter are much more difficult to secure and necessitate special procedure in connection with each type of learning. Finally, the teacher's technique in using suggestive supervision without too much assisting was described and the general point noted that supervised study upon a difficult new topic should precede home study upon the topic.

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Exercises and added references. — See above, p. 390.

CHAPTER XVII

THE USE OF BOOKS

Main points of the chapter. — 1. The use of books is a most important process in social life, and it is the most economical means of instruction in school.

2. Textbook study should be supplemented by other required readings and by independent investigations by students upon assigned topics.

3. Great care should be exercised to select textbooks that treat subjects intensively in a manner that can be easily understood by students.

4. The recitation period should be used primarily for interpretative and supplementary discussion, although testing should not be neglected.

5. For required supplementary reading, sufficient duplicate copies of a few serviceable books should be available, and exact page assignments to these should be made.

6. Contribution recitations can be effectively organized on the basis of such supplementary reading and of more elaborate independent investigations of special topics by individual students.

7. In such investigations, students should be trained to pursue standard bibliographical methods.

8. The system of oral reports based upon such investigations should be standardized and routinized so as to include frequent conferences with the instructor, descriptive bibliographies, carefully prepared briefs, and oral reports of varying length adapted to the capacities of individual students.

Principles previously developed to be applied to special technique. — In the discussions which preceded this chapter we laid down most of the fundamental principles that should govern instruction, and from now on we shall be largely concerned with certain special types of technique to which these principles apply. Among the topics which we have considered and which should be kept in mind as the background of the discussion that is to come are the following: the fundamental aims of education, which are to be conceived in terms of economic, civic, and domestic efficiency, good will, and harmless enjoyment; the proximate, or immediate, aims of instruction, as health, information, habits, ideals, and abiding interests; the need of economy in the management of all endeavor to attain these aims; the selection and arrangement of subject matter so as to adapt it to contemporary social needs and to the interests and capacities of the students; the way the learning process is carried on most economically in the various types of learning involved in high-school studies; the problem of adapting lessons to the students' past experiences and present frame of mind in order to secure the desired educative responses; the utilization of students' instinctive and habitual interests so as to secure economy in learning; the arrangements to vary assignments and recitations so as to adapt instruction to variations in the capacities of students; the supervision and direction of students while they are studying, in order to avoid misapplication of effort.

Four sources of subject matter: books, teacher, past and present real experiences. — The next general topic to be considered is the special technique of using various possible sources of subject matter in accordance with the principles outlined above. The most common sources of the subject matter of instruction are books. Another source is the teacher, especially when the lecture method is used. Other sources are the students' real experiences with things and persons in school and in the world at large. The laboratory method is based on the use of the present real experiences of students, while their past real experiences are often especially utilized in conversational methods. Thus we may distinguish typical sources of subject matter which give four types of method;

namely, book methods, lecture methods, laboratory methods, and conversational methods. The effective administration of these methods involves, for the most part, simply specific application of the principles discussed up to this point; but in order to get the special technique of each method in mind, we shall devote a brief chapter to each one except the lecture method, which is so seldom used in American high schools that a special discussion of it is not needed.

Reflective reading of books a most important social process. — In taking up the consideration of the use of books, the first point to get clearly in mind is that the study of books and other printed material is not simply a matter that is important in schools, but it is one of the chief means of getting ideas in social life at large in many fields where the acquisition of new ideas plays an important part. It is necessary to emphasize this point because, very often, educational reformers, in their zealous emphasis on the value of real, first-hand experiences, seem to overlook the fact that profiting by the experiences of others is equally important. The reflective reading of books and periodicals constitutes one important means of sharing the experiences of others. Hence any teacher is neglecting his duty who does not keep thoroughly in touch with the developing literature of the subjects he teaches, and who fails to keep students at work upon this literature and to teach them how to find it and utilize it effectively. We do not deny the value of shop and laboratory training; these also have their place; but enthusiasm about these should not lead to the neglect of training in the use of books and libraries. In every field intelligent, reflective reading is increasing in importance with the increase in the output of general and specialized books and magazines adapted to the rank and file of readers.

Memorizing ideas from printed material also important in practical life. — Moreover, not only is *reflective* reading important, but also reading which is intended to fix the ideas in the reader's mind. The importance of reading to remember, that is, the *memorizing* of ideas, is overlooked by many radical educational reformers. Very often I hear students say, "The world does n't care about what I know; it cares about what I can do." Usually such students have the notion that there is little connection between knowing and doing. As a matter of fact, almost all significant social doing depends upon a well-organized body of technical information, and in many positions the amount of information to be acquired as the basis of efficiency is very large.

In view of these facts we shall emphasize training in the use of books and other printed material as the basis of some of the most important methods of instruction to be used by teachers in high school.

Books used as textbooks; for supplementary reading; for investigations. — Procedures in using printed material as the source of subject matter in school may be classified as follows:

1. Study and recitations based upon required textbooks.
2. The use of other printed material by the students.
    a. As supplementary to required textbooks.
    b. As the principal source of subject matter for regular recitations.
    c. As the basis of extended reports by students, prepared after independent search in many sources for material.

We shall consider these methods of procedure in the above order.

Textbooks. *Exercise care to select well-constructed, appropriate ones.* — The first important point in connection with the use of textbooks is to exercise the greatest care in making the proper selection. The teacher should acquaint himself with all the best textbooks in his line by reading reviews of new books in educational journals, by examining collections of textbooks whenever opportunity offers, in bookstores, libraries, etc. and by discussing the relative merits of textbooks with other teachers. In determining the merits of a book the principles laid down in Chapter IV on the selection and arrangement of subject matter are especially important, and the reader should review them at this point and consider their application to the selection of textbooks. If this is done, the teacher will select textbooks which contain material that is related to contemporary social needs, and that is adapted to students of the special type that he has to teach. Moreover, instead of containing a very meager treatment of a great many topics, each book should contain a very full, illuminating treatment of a few topics. If the term *textbook* must continue to suggest merely outlines of topics and attenuated general statements which need much further elaboration and explanation to enable students to understand and appreciate them, it is time we adopted a term that would suggest sufficient fullness of treatment of a limited number of topics to convey easily to the reader a clear understanding of the topics discussed. As Thorndike says, " There is no wisdom in the notion that a textbook is to give the subject matter of a course, but in so difficult a form that every teacher must illustrate and explain it at great length." (**4** : 163)

Avoid misunderstanding and misuse by teacher.—After a textbook is adopted, the teacher should study it thoroughly in order to use it intelligently. Some books do not involve any necessary order in the study of the chapters which they contain. In such cases any order which the teacher may devise might prove satisfactory. In other books, however, little departure should be made from the regular order of the chapters. For example, in Coulter's " Plant Relations " technical terms are introduced gradually. In the beginning, terms of ordinary speech are used almost altogether, but now and then, when a technical term can be introduced to advantage, it is inserted in parenthesis after the ordinary term and soon is substituted entirely for the latter. As the reader progresses through the book the language becomes more and more technical, until he encounters such sentences as are contained in the quotation given above near the bottom of page 206. Obviously, a high-school student introduced to the book at this point would have great difficulty in reading it.

Another type of mistake in using textbooks is illustrated in the use of Thorndike's "Principles of Teaching," with which readers of this book are probably familiar. One third of Thorndike's book is devoted to exercises or problems which it is expected will occupy two thirds of the student's time when he is studying the book. Yet I have known instructors who used the "Principles of Teaching" as a required textbook but did not have the students study the exercises at all. This shows that even when a textbook is so constructed as to provide especially for reflective thinking, teachers may fail to use it so as to secure this desirable mental activity. Such misuse of textbooks leads Thorndike to say:

> Many of the evils attributed to the overuse of textbooks are really due to misunderstanding and misuse of them. In the case of a good textbook there is a reason for every item and for its position in the whole. Too few teachers know the exact purpose of the textbooks they use. Too often a teacher uses a section of a book much as a savage might use a coat to cover his legs, or as a child uses a saw to cut a string, scissors to cut a board, and a padlock as a bracelet. (**4**: 166)

Review principles that apply. — In the use of the textbooks the following sets of principles, discussed at length above, should be applied by the reader: (1) Principles of economy in handling materials, discussed on pages 34–41; (2) economy in memorizing (pp. 153–164); (3) reflective thinking (pp. 171–176, 191, 203, 206–212); (4) distinction between studying and reading for enjoyment (p. 262); (5) avoiding verbalism (that is, words without ideas) and putting the pupil in the right frame of mind (pp. 301–311);

(6) arousing interest in assignments (pp. 338–339); and (7) assisting pupils while they are studying the textbook (pp. 411–417). The specific application of these principles to the use of the textbooks need not be elaborated here.

Textbooks furnish most economical basis of instruction. — If properly constructed and used, textbooks provide the most economical form of instruction. As compared with the lecture method, for example, Thorndike estimates that "the actual facts, principles, and applications given in a college course of ninety hours can often be printed in a book that a capable reader could get through in nine hours." (**4** : 162)

Textbook may train in reflective study. — Moreover, if properly constructed and used, textbooks may not only serve as a source of information but also provide directed training in reflective thinking. The construction of textbooks to provide such training in other subjects than mathematics has been treated at length in the chapter on reflective thinking (pp. 171–176).

In order to secure reflective study instead of mere memorizing, two practices are desirable: (1) assignments should be so made as to necessitate a study of the textbook in order to comprehend it and to secure answers to problems or questions which involve analytical study; (2) the recitation period should be used largely for interpretative and supplementary discussions instead of simply for testing to determine whether the students have studied their lessons. If the method of supervised study is employed, the text assignment will be taken up for discussion before it is read completely by the students; then the class will be put to studying it while the teacher passes around the room and supervises. The objective results in the form of outlines, etc., described above on page 412, should require reflective attentive analysis of the assignment.

Use recitation for interpretation and application. — The common practice of using the class period for mere repetition of material learned in the textbook is one of the most pernicious sources of waste and lack of interest to be found in schools. Time is wasted because nothing new is provided for those who have learned their lessons, and interest is lacking for the same reason. Almost the only way to secure interest in such recitations is by appeals to emulation or to the desire to show off, or through fear of some penalty. Instead of such recitations the teacher should raise questions which keep the pupils actively thinking because they involve (1) interpretation, (2) criticism, (3) supplementing, or (4) application along the lines studied in the assignment. The fact that the major part of the recitation period is to be given up to this type of activity does not mean, however, that quizzing to determine whether the lesson has been learned should be omitted altogether. The latter practice should also be specifically provided for, as will be described in a later chapter on testing.

Supplementary reading. *Provide definite assignments to sufficient duplicates.* — A most fruitful and valuable method of instruction is to have one or two required textbooks possessed by all students in the class, and to supply in addition to these a sufficient number of duplicate copies of a few closely related books, which will be kept on reserve in the library or classroom for the use of all classes that are studying the subject which they cover. These may consist of other textbooks or of source books or more general treatises. Sometimes these may be read and studied in class, as described above on page 38. The value of such critical, interpretative treatment of printed material is self-evident. The justification for equipping schoolrooms and libraries for this purpose is set forth by Keatinge in the following quotation, which follows his discussion of the using of sources in history for the solution of problems, as described above on page 174.

> For work of this kind it is essential that the apparatus, that is to say, the documents, shall be in the pupils' hands. Documents as *read* to a class have their value as giving atmosphere, but for the present purpose each boy must have his own book of extracts,

which can be supplemented on the part of the teacher by [mimeo-]graphed slips. The science teacher is not expected to obtain results without apparatus; each boy is provided with his bench, his balance, his test tubes, and his water tap. It would be in the highest degree unreasonable to ask the history teacher to convert his subject into an educational instrument with nothing but the textbook to fall back upon.

Here there is difficulty to be faced. If documents are to be provided in the necessary abundance, a series of volumes is required, and many schoolmasters would shrink from asking their pupils to buy a fresh book, at the cost of a few shillings, for each short period of English history. The science laboratory indicates the solution of the problem. Boys are not expected to buy their own water taps, Bunsen burners, and other apparatus; the school provides them and sometimes makes a small . . . charge for their use. In the same way the source books here referred to must be supplied as school property, and the sum of some twenty-five pounds will supply a complete laboratory for school use. (**5** : 92–93)

Library reading an uneconomical primary source of subject matter. — Sometimes teachers advocate having no required textbooks and depending entirely upon reference reading as the source of subject matter. If nearly all studying is done during the regular school day, and thoroughly adequate equipment is provided, and definite page references given in the assignments, this method may work satisfactorily. Sometimes teachers try to use this method, especially in college, without providing for these essential points. The result is that students waste a large amount of time trying to get an opportunity to read the assignments. This point has already been covered in the chapter on economy in classroom management (p. 38). Often the very instructors who object most strenuously to the use of textbook methods are the ones that are most careless and neglectful in attending to the routine of organizing the arrangements for reference and reserve books. On the other hand, the teachers who provide for the most economical, effective, and educative use of required textbooks by their students sometimes provide most thoroughly for supplementary reading also.

Use mimeographed study questions for directing reading. — In order to make such supplementary reading economical and effective, the teacher should provide not only mimeographed page references, but also copies of questions or problems to be used as the basis for examining each reference. An example of such a practice is the following from the work in history conducted by Mr. A. F. Barnard in the University of Chicago High School.

THE WAR WITH PYRRHUS

Assignment: Plutarch — Life of Pyrrhus

1. From what heroes was Pyrrhus descended, according to legend? (Sec. 1.)
2. What was Hannibal's opinion of Pyrrhus as a general? (Sec. 8.)
3. What were the difficulties of the Tarentines? (Sec. 13.)
4. Why did they choose Pyrrhus as ally? (Sec. 13.)
5. What were the motives of Pyrrhus in accepting the invitation of the Tarentines? (Sec. 14.)
6. What were the forces of Pyrrhus, according to Plutarch? (Sec. 15.)
7. How did Pyrrhus prepare the Tarentines for war? (Sec. 16.)
8. What did Pyrrhus commend in the Roman army at Heraclea? (Sec. 16.)
9. Give reasons for the defeat of the Romans. (Sec. 17.)
10. What was the comment of Fabricus on the result of the battle? (Sec. 18.)

Contribution recitation based on varied supplementary assignments. — The definite assignments to easily obtained supplementary material may be varied for the different members of the class either by assigning different topics to different students or by assigning different authorities to be consulted upon the same topic. Such assignments give the basis for contribution recitations, to which reference was made on page 288. If such assignments are properly routinized and students held strictly accountable for results (that is, for consulting the authorities, mastering the content, and expressing it well in their own words when called upon), the contribution recitation constitutes probably the best type of classroom activity in connection with the content subjects.

Reports based on independent investigations of assigned topics. *Special technique of administering.* — A much more elaborate development of the contribution recitation is found in the oral reports made by students after considerable independent search, covering days or weeks, for material upon specially assigned topics. Such reports involve all the essential elements of the best training in expression and in the use of books; namely,

1. A clearly defined topic or problem upon which information is desired.
2. Independent search for printed discussions bearing upon the topic.
3. Selection of relevant material from much that is irrelevant.
4. Independent, careful organization of the relevant material in the form of briefs.
5. Expression of the results of the investigation to an audience.

In the administration of such a system of reports many conferences between the teacher and individual pupils must be held. If regular periods of supervised study are provided, or conference hours by the instructor, these conferences can easily be arranged. At all points both economy of effort and effective training must be kept in mind. We shall comment on each of the elements numbered above from these points of view.

1. *Define topic clearly during conferences.* — In defining the assignment the teacher will necessarily play a large part,

since each pupil's topic and report must fit into a well-organized scheme. It will usually be found, however, that the student cannot get the limitations and essentials of his topic in mind at the first conference, because he has little background or basis for doing so. Hence he should be sent away with the direction to come for another conference after he has spent from one to two hours working upon the topic in the library. During this work the topic will begin to open up to him, and in a second conference much progress can be made in laying down the general lines that are to be followed in the investigation. At all stages, however, the instructor must watch the student's success in keeping to his problem or topic. This is important not only from the standpoint of the training it affords the student, but also because it avoids overlapping in the oral reports. Such overlapping removes one of the most essential conditions of success in the scheme; namely, the existence of a real audience situation for each student who is reporting.

2. *Definite bibliographical training for independent investigation.* — In having the student search independently for material on his topic, the element of economy of time and effort is sacrificed somewhat in order to secure greater training. This contrasts very strongly with the course pursued in using supplementary assignments as the source of subject matter for daily recitations, for in the latter case the most definite page references to readings are desirable. However, the requirement that students should search independently for material does not mean that they should search without the aid of all the methods of skilled bibliographical work that can be placed at their disposal. On the contrary, they should have definite specific training in bibliographical practice. This training should be inaugurated by the librarian of the high school (if there is such a person and he is well trained), or by the English department, or by some member of the faculty who is a skilled bibliographer — for some

teachers are by nature and training much more skilled than others in directing library work. The essential elements in the technique of bibliographical work can be taught in a few lessons. The chief matters to be taken up for discussion are the following:

a. The location of libraries and collections which the students may use.

b. The systems of classification, cataloguing, and shelving used in the libraries to which the students have access.

c. The names and methods of using standard general books of reference, such as the various encyclopedias, atlases, almanacs, yearbooks, statistical summaries, etc.

d. The names and methods of using the general periodical indexes, such as Poole's Index, the Cumulative Index to Periodical Literature, etc.

e. The names of special bibliographical aids in the field in which the topic under investigation lies, be it chemistry, or history, or literature.

f. The methods of making a fairly thorough, representative, descriptive bibliography on a given topic before doing much intensive reading on a few references.

If the students have not received general training along the above lines, the teacher using the method of supplementary individual reports which we are discussing would have to train the students himself. He could do this by giving the class general directions and discussions, and he might also spend a little time in the high-school library or public library when his students are there, in order to give them individual assistance at the beginning.

Thorough preliminary bibliographical survey to precede intensive reading. — Paragraph *f*, concerning the methods of making a survey of the available material before studying any of it intensively, deserves special emphasis, since much time is often wasted through failure to follow this rule. Thus, even college graduates will often spend hours in reading relatively poor discussions of a topic, because they happen to have found them first, when they might have saved this time and been reading much more useful discussions if they had continued their preliminary bibliographical survey until they had covered the standard literature in the related field. I have encountered graduate students in my classes who had been working upon experimental investigations of educational topics for six months, and who, when asked if any similar investigations had been made, have replied, "No." Then, when they have been directed to spend five or ten hours upon bibliographical work, they have not only found many critical printed discussions on the topic, of which they had no previous knowledge, but have sometimes found that the very problem upon which they were at work had been thoroughly investigated by others.

The number of references that can be found, examined briefly, and described in writing in a few hours of well-directed bibliographical work is usually astonishing to students who have never attempted it. When this preliminary survey is well done, it commonly results in the discovery of excellent references that would otherwise have been missed altogether, and it saves spending time upon the reading of inferior, second-hand material. Hence the instructor should require the student to report at a conference with a representative, descriptive bibliography before he proceeds to do much intensive study of selected references. There is a striking contrast between the results obtained in high school by this method and those obtained by one in which the student finds one or two references and copies his material from them.

For an excellent example of a descriptive bibliography (that is, one that contains a brief description of each reference) the reader should examine the one on The High-School Library, in Johnson's "High-School Education." (**2**: 527–531.) This will not only give a clear idea of the character of a good bibliography, but will also put the reader in touch with much valuable material along the line of the present discussion.

Sometimes, in order that economy of effort may not be too much sacrificed in favor of training in independent search for sources of information, the teacher may start the student with one or two references which will open up the way to others. As indicated in the discussion of the collecting instinct, on page 354, the process by which initial references lead to the finding of others, and these to still others, is often a fascinating one. Unfortunately it often happens that even a graduate student, whom the instructor has started by referring him to a specific chapter that is filled with references to the monograph literature on the topic under investigation, will come back to his next conference for further aid without its ever occurring to him to pursue the references thus opened up to him.

3. *Stimulate the careful selection of relevant material.* — Training in the rigid selection of relevant material is generally needed by high-school students, since it is also needed even by college students and graduates. Students very commonly fail to distinguish between material that is interesting in general and material that is strictly relevant to the topic as it has been defined for the purpose of the report to be prepared. Often, as a result either of mental laziness or of failure to discriminate, they will bring, along with pertinent citations which they have found, much discussion which may have been appropriate in the article from which they have culled the material, but which is not appropriate to their own topic. It is clearly the business of the teacher to check this tendency in the conferences and also in the oral reports, if the irrelevant material ever gets that far.

4. *Well-organized brief necessary for clear and relevant report.* — In order that the oral reports may be protected against just such inadvertences as were mentioned in the preceding paragraph, it is especially important that before a

report of any considerable length is presented, the brief upon which it is based should be examined by the teacher. The brief should be very strictly inspected from the standpoint of clearness of thinking, relevancy of material, organization and value of points, clearness of phraseology, etc. As stated above, on page 280, where the use of briefs was discussed at length from the standpoint of training in expression, they should not be accepted in the form of mere outlines of topics, but should consist of completely and concisely stated propositions or sentences.

5. *Oral reports to be varied with capacities of students.* — The oral reports upon topics which have been investigated and developed as described above may vary from two minutes to fifteen minutes in the case of most high-school students. Occasionally, longer reports may be given by specially qualified members of the class. Individual differences in capacity make an enormous difference in the amount of time to be allotted to different students. If a student is so obviously deficient in native talent for making oral reports that he would never be expected to do anything in this line in the world at large, it would probably be well not to permit him to give an oral report, in order to avoid wasting the time of the class. Other students might be relatively lacking in capacity but still be capable of getting material into shape for a report of two or three minutes, on topics of special interest to them and on which they were especially well informed. In a high school where this method of reporting was in regular use in the content subjects, fully two thirds of the students were able to make reports that were satisfactory from the standpoint of effectiveness and the economy of time and effort of all concerned.

Inasmuch as these reports should be merely supplementary to well-organized required reading in textbooks and reserved books, they will not be very frequent. It would furnish very valuable training, however, if each fairly capable student could give two reports a year in each of two or three subjects — for example, in history, science, and literature. For each of these reports considerable time could be spent in library work and in the organization and preparation of the material for presentation. In addition to these longer occasional reports, shorter reports of two or three minutes' length might be presented at nearly every recitation. Many teachers follow this practice not only in high school but, in some cases, even in the elementary schools.

A valuable form of training administered by standardized routine. — The system of reports discussed above illustrates the combination of general pedagogical principles which occurs a number of times in our discussion. (1) In the first place, a process and method which is of fundamental importance and value in social life should be represented in the training provided in school. The independent investigation of topics and the organization of reports upon them is the example which concerns us here. (2) In the second place, the system of training which is recommended departs from the ordinary practice of depending entirely upon textbook recitations, and seems very elaborate, since it requires many varied assignments to different students and conferences with individuals. (3) But even the most novel and complicated scheme can be effectively administered with little extra time and effort if special machinery is devised so that a large part of the administration becomes a matter of routine. Thus every movement proceeds according to certain definitely standardized steps, which are routinized through printed and mimeographed directions and by strict adherence to definitely established rules of procedure.

Conclusion of discussion of use of books. — In this chapter we noted first that the use of books constitutes one of the most important and valuable methods of study in social life. In providing corresponding training in school, properly selected textbooks furnish the most economical basis. These should contain thorough and adequate discussions of carefully selected topics and should be used so as to require reflective analytical study and interpretation as well as memorizing. Textbooks should often be supplemented in the daily class assignments by definitely assigned readings in a select list of supplementary books, of which a sufficient number of duplicate copies are available. In some of the content subjects further training should be provided in the independent investigation of topics by standard bibliographical methods, according to a definitely standardized, routinized scheme of assignments, conferences, briefs, and oral reports.

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2. KOCK, T. The High School Library. In JOHNSON, C. H., *High School Education.* (Charles Scribner's Sons, 1912.) Pp. 460–470 and pp. 526–531. An excellent chapter with a bibliography which should serve as a model to all makers of bibliographies.

3. STRAYER, G. D. *The Teaching Process.* (The Macmillan Company, 1911.) Pp. 107–113. A chapter on the recitation lesson.

4. THORNDIKE, E. L. *Education, a First Book.* (The Macmillan Company, 1912.) Pp. 161–167. A strikingly original discussion of the use of textbooks.

Quoted incidentally in the chapter. — 5. KEATINGE, M. W. *Studies in the Teaching of History.* (A. C. Black, London, 1910.)

EXERCISES

For problems for class discussion of Chapter XVII, see *Exercises for "Methods of Teaching in High Schools,"* pp. E 216–E 228. These pages include also a poem about "tunneled textbooks," a report of a recitation on socialism, testimony concerning the value of oral reports, and sample directions for library lessons.

CHAPTER XVIII

CONVERSATIONAL METHODS

Main points of the chapter. 1. Conversational methods depend largely on the past experiences of students as the sources of subject matter.

2. These methods were popularized in the form of Pestalozzian oral instruction and Herbartian development methods in the nineteenth century.

3. The Socratic method is an especially circuitous form of the conversational method.

4. Conversational methods are very likely to be wasteful unless controlled by definite objective points and unless the teacher frequently tells the subject matter instead of waiting to elicit it by questions.

5. Conversational methods are especially useful in reflective thinking and in making assignments of lessons to be studied.

Conversational method works over the student's previous experiences. — The methods which we discussed in the preceding chapter on the use of books placed the emphasis upon enriching the student's experience by adding to it in considerable degree. The conversational method, which we shall consider in this chapter, depends largely upon experiences which the students already possess. These are recalled and worked over so as to derive new combinations of familiar elements. From time to time the teacher may give new information if it is needed, but for the most part he asks questions which require the students to recall certain previous experiences and view them from a new angle or use them for a new purpose. Sometimes the experiences which are drawn upon are quite similar for all the students. For an example, recall the instruction concerning the difference between chemical and physical changes, described above on page 207. If the teacher wished to work out this difference by the conversational method instead of having it set forth in the textbook, the examples used (namely, rusting iron, exploding powder, etc.) would probably be common to the experiences of *all* the students. On the other hand, in discussing some topics certain students would be able to contribute pertinent experiences which would have been shared by very *few* members of the class. For example, in geography lessons it often happens that students who have traveled or lived in different parts of the country are able to give just as good and full information concerning a certain region as is found in the books, and to give it more vividly and at just the point where it is needed in the discussion. Thus, in a Chicago school a lesson on the climate of California was being taught largely by conversation based on a consideration of the fundamental facts of elevation, prevailing winds, etc. Certain students who had been in San Francisco and others who had been in Southern California gave descriptions of the climate of these regions, which verified the conclusions reached by the reflective consideration of physiographic data derived from the map.

Sometimes called the development method. — The conversational method is especially usable in reflective thinking or reasoning, because students already possess a large body of experiences which may be analyzed, compared, classified, and worked up into generalizations or interpreted from the standpoint of generalizations which have already been achieved. It may also be used in connection with other types of learning, but not so extensively. It is commonly called the *development method*, but the term *conversational method* is chosen for use here because it is more descriptive of the character of the process of give and take which is carried on between teacher and pupils who are at work upon a common topic of discussion.

Entails large waste if used by an ignorant teacher. — Apparently skilled teaching may be carried on by the conversational method by teachers who have had little training but who possess considerable natural teaching ability. The teacher and students are all mentally alert, there is keen questioning and active discussion, and the process appears very fine to an ordinary observer. To many persons such activity represents the acme of skill in teaching; and possibly it is, if the content that is worked out is of value and the conclusions are true. Unfortunately such is often not the case, and ignorant teachers frequently make students waste their time in learning matters that are useless or even false. It would be much better for them to be discussing and interpreting the meaning of assignments in textbooks which contained material carefully selected and arranged by experts in the subject.

Popularized as Pestalozzian oral instruction in nineteenth century. — The conversational method became popular during the nineteenth century as one phase of the Pestalozzian improvements in method, especially in elementary schools. In the Pestalozzian reforms oral or conversational instruction went hand in hand with object teaching, which began to supplement textbook instruction to a considerable extent. A new type of skill was required in the former method, different from that often employed in textbook instruction. Hence we find schoolmen of this period commenting on this fact; for example, W. T. Harris, in his report as superintendent of the St. Louis schools in 1870, wrote as follows concerning conversational instruction:

> It seems to me this phase of the subject — its value to the teacher — is worth quite as much as the immediate value of these lessons to the pupil. . . . The teacher is led to study and thoroughly prepare herself, and then in the lesson she is led to probe, in a freer manner than ordinary, the miscellaneous fund of experience possessed by the individuals of her class; thus she cannot fail to find herself getting more and more emancipated from the slavish

use of the textbook and able to stand before her class with a consciousness of her strength and ability to draw out the resources of each and all her pupils and combine the same into one result.

Exploited by American Herbartians after 1890. — A second impulse which tended to popularize the conversational method came from the activities of American followers of Herbart, whose theories were vigorously elaborated and exploited in the United States from about 1890 to 1900. The best-known exposition of the Herbartian use of the conversational method is found in the chapters by Frank McMurry in "The Method of the Recitation" (published 1897; revised 1903), a book written by two brothers. In treating the step which is known in the Herbartian process of instruction as the step of *presentation*, Frank McMurry says:

> The *developing plan of teaching* is one radically different from the lecture and the textbook methods. The teacher who employs it lectures but little to her class, although it is important to remember that she does tell some things outright; neither does she allow the facts that are to be learned to be first presented through a textbook; she prefers to develop facts and conclusions by conversation with the pupils. (**4**: 121–122)

Example of conversational treatment of a geography lesson. — As an example McMurry details a conversational lesson on the industrial geography of the British Isles as follows:

> In the developing plan the book would not be used at first; the following might be the nature of the conversation that takes place in the class, the teacher beginning thus:
>
> Many years ago it was discovered that there was an abundance of iron ore in England (showing where). Also a great quantity of coal was found in certain places (use map). So much being true, what might follow? When people have plenty of iron ore and coal, they can make pig-iron and all sorts of things . . .; for instance, nails, screws, hatchets, axes, plows, rails, locomotives, all sorts of machinery, cutlery, iron ships, etc. What effect would that have

upon the number of people to be found in the region where these manufactories exist? Large cities would spring up. Thus, Manchester, Leeds, Sheffield, Birmingham, Nottingham, and Glasgow, which you will find on the map.

Since so many people are engaged in manufacturing, what would be done with the articles that they make? They cannot use them all at home. Then what will be done with them? Some of them must be sent away to other countries. What, then, will be some of the exports of England? Rails, engines, etc. Through what ports would they be likely to leave England? (Examine map frequently.) It would depend upon the direction in which they were to be sent. If to Europe, they would go by way of Hull or London; if to America, by way of Liverpool or possibly Bristol. What effect would this commerce have upon the size of these ports?

If so many of the English people are engaged in manufacturing, and they send so many things abroad (to America, for instance), what are some of the things that they are likely to need from us? Food. What, therefore, would be some of their imports? Grain, meat, tobacco, etc.

But England is an excellent country for grass. Can you tell why? Because of the moist atmosphere and frequent rains. A considerable part of the country, too, cannot well be cultivated; can you tell why from the map? It is too hilly and rough in the west. Yes, also in places it is too swampy. In many of these regions sheep are raised. What is likely to follow from that fact? Much wool, much manufacture of clothing, since coal is abundant. Hence, increase in size of cities, in importance of ports, etc.; clothing is one of the exports, etc.

All of this conversation could best take place before the paragraph in the book is assigned as a lesson. (**4**: 123)

Contrasted with lecture method in Herbartian book. — Another example of the use of the conversational method as a means of presenting lessons to students is given by Frank McMurry in the form of a lesson on the battle of Bunker Hill. In it the teacher gives a few facts, and then the students are led by questions to discover just how the battle was fought out. It is interesting to note that the method of handling the step of presentation by the other author of the book, namely, Charles McMurry, is just the opposite of that used by his brother; that is, Charles uses the lecture method in his sample lessons instead of the conversational method. This comes out clearly when we contrast with Frank's conversational treatment of the battle of Bunker Hill Charles's treatment of the battle of King's Mountain, given on pages 270–281 of "The Method of the Recitation." In the latter case the step of presentation consists of eight pages of almost solid lecture supposed to be derived by the teacher from Irving and Fiske's "Washington and his Country." This extreme contrast in the treatment of the same step in the so-called development method is one reason why we use the term *conversational method* here instead. It is often difficult to determine just what is meant by the term *development* as applied in discussions of method.

Criticism of eliciting everything by questions. — The contrasting extremes in the treatment of the step of presentation, namely, conversation and lecturing, are often found in the organization of practice teaching in normal schools. The extreme of eliciting everything by conversation is criticized by Adams in the following quotation:

> The view that all teaching resolves itself into the direct giving of information, the telling the pupil something new, has produced a natural reaction which leads to error in the application of presentation, or rather by the elimination of presentation. From their studies in theory young teachers are inclined to avoid anything in the form of direct presentation. The second step [in the Herbartian formal steps, namely, presentation], while still monopolizing their attention, is regarded with suspicion. What is contemptuously called "telling" is regarded by these young teachers as in the highest degree unintelligent and unscientific, and they fall into ludicrous errors in their efforts to avoid it. Everything must be, in the words of their textbooks, "elicited from the pupil by skillful questioning." They do not realize that there are two kinds of knowledge, one that must be communicated directly and another that

may be worked up from materials already in the mind. We want very badly a couple of words to keep those two kinds of knowledge from getting mixed. I cast covetous eyes on the two words *information* and *instruction*. The first would very well represent the communication of new facts, the second might stand for the rearrangement of facts that are already known to the pupil-mind in one way, but that, by being recombined, may produce knowledge that was latent, if you like, but that certainly would never have come to light at that stage but for the intermediation of the teacher. It is information to tell me the Japanese word for a tree. If I do not happen to know the word, no amount of skillful questioning will ever elicit it from me. On the other hand, the generalized formulæ of Euler's theorem may be said to be implicit in the pupil's mind before he approaches the problem. All the teacher has to do is to arrange that certain ideas shall be grouped in a particular way, and the formulæ issue of themselves. The meaning of *instruere*, that our dealings with Cæsar have familiarized us with, comes in very appositely here. The general draws up the line of battle, now making one formation, now another. In every case the men, like the ideas, are given. Information is as different from instruction as recruiting is from drilling. (**1**: 153)

The Socratic method a circuitous form of the conversational method. — A special form of the conversational method is the Socratic method. Sometimes the latter term is used to designate any question-and-answer method of instruction, but this is probably too broad a meaning to give it. There are two notable characteristics of the dialogues which we think of as being those of Socrates: the first is that Socrates did nearly all of the thinking and suggesting, the person who was questioned serving largely as a foil or mark, just as one end man does in a minstrel show when the other is telling a joke; the second characteristic is the large amount of contradiction in which Socrates artfully entangled the unsuspecting foil or "quizzee." Just as the minstrel method often seems a needlessly long-winded, unnecessarily elaborated method of getting a joke to an intelligent audience, so the Socratic method, when applied to the teaching of specific truths, seems a needlessly roundabout and wasteful method of reaching a definite point.

Example of modern Socratic method. — An example of a typical Socratic lesson is given by Adams and quoted below. In studying it the reader should consider whether a more direct method of handling the difficulty would not have been more economical and just as effective. Adams says:

> To illustrate, take the case of that constant difficulty at the early stages of composition, the incomplete sentence. Pupils brought up in illiterate homes are very apt to make a relative clause stand by itself, with no other help than the original grammatical subject. In schools where the pupils come from homes in which grammatical English is habitually spoken, there is not so much danger of this particular form of error, but every teacher in a school for the poorer classes is unpleasantly familiar with such a sentence in a pupil's exercise book as "John who broke the window." The following is a verbatim reproduction of a lesson actually given to a class of about sixty-five rather dull boys whose ages average eleven and one-half years. The sentence had occurred in one of the class exercise books, and was placed on the blackboard, as it had been written, with the addition of a comma after the word John.
>
> *Teacher.* Now what did John do?
>
> *Pupil.* (Confidently) Broke the window.
>
> *T.* Then what did *who* do?
>
> *P.* Broke the window.
>
> *T.* Were there two windows, then?
>
> *P.* No, sir.
>
> *T.* Then who broke it?
>
> *P.* John.
>
> *T.* And what did *who* do?
>
> *P.* (Doubtfully) It says "*who* broke the window."
>
> *T.* Did it take two to break the window?
>
> *P.* No, sir.
>
> *T.* Then which of them did the breaking?
>
> (Pupils puzzled. No answer.)
>
> *T.* How many people were there altogether?

P. (Cautiously) *John* and *who.*

T. Now, which was bigger, *John* or *who*?

P. They 're both the same.

T. Then there was only one person there?

P. Yes, sir.

T. And what was his name?

P. John.

T. And what did he do?

P. Broke the window.

T. Then would it not be enough to say, "John broke the window"?

P. Yes, sir.

T. Is that what it says on the blackboard?

P. No, sir; it says, "John *who* broke the window."

T. And *John* and *who* are the same person?

P. Yes, sir.

T. Then they both have the same right to the verb?

P. Yes, sir.

T. Which of them is nearer the verb?

P. *Who.*

T. What mark is between *John* and the verb?

P. A comma.

T. Now if only one of the two can claim the verb, which has the better right to it?

P. *Who.*

T. And every noun and pronoun that is a subject must have a verb?

P. Yes, sir.

T. Then if *who* gets *broke*, what verb is left for *John*?

P. None.

T. How many subjects are there here?

P. Two.

T. And how many verbs?

P. One.

T. And every subject must have a verb?

P. Yes, sir.

T. How many verbs do we need, then, besides *broke*?

P. One.

T. Give me one.

(No answer.)

T. John (who broke the window) did something, or was something. What would you do if you broke a window?

P. (Promptly) Run away, sir.

T. Finish it, then. John, who broke the window, ——.

P. Ran away.

T. Which are the two verbs now?

P. *Broke* and *ran.*

T. Which belongs specially to *who*?

P. *Broke.*

T. And to *John*?

P. *Ran.* (**1**: 81–82)

Some teachers approve extreme wandering in discussions. — Sometimes teachers who are using the conversational method do not keep any specific objective point in mind, being unlike Socrates, who always had a definite purpose, although the foil or person who was being questioned was generally unaware of it and did n't know whither he was being driven. These teachers sometimes say they do not care where the students arrive, so long as they are mentally active. The teachers take up with any issue that is raised in the class discussion and follow it anywhere it leads. Sometimes they sincerely believe that this is the best use to which the class period could be put. Sometimes they are lazy teachers who fail to prepare definite material for the period and find it an easy way to keep the class interested and to get through the hour. Sometimes they are easy teachers who do not require their students to study consistently and for whom the latter prepare by saying, "Let 's see if we can't get up a discussion to-day, so we won't have to recite." Sometimes the teachers are incompetent thinkers, who cannot distinguish quickly between what is relevant and useful and what is not; hence they easily get led astray in the discussions by inappropriate suggestions of the students.

Much better to tell some things than to waste time.— Such poor administration of the conversational, or question-and-answer, method is condemned by Bagley in the following words:

> Among some educators there is a superstition that the question-and-answer method is the only true method of instruction. This exaggerated view finds expression in the unwillingness to impart information in any way save by Socratic questioning. Valuable time is spent in attempting to get children to discover unimportant truths under a vague and hazy notion that it does n't matter much what the truth is so long as the child discovers it for himself, and so anxious is the teacher to have him discover it for himself that he spends twenty or thirty minutes in a "pumping" process to get a result which could have been stated in as many seconds.
>
> It is this tendency to beat about the bush that constitutes the most dangerous pitfall of the question-and-answer method. Some judgments are not worth developing; they may better be stated as clearly and tersely as possible. The danger of confusing the pupil with a mass of details is also a source of some inadequate results in the application of this method by unskilled teachers. If the teacher is himself incapable of keeping system and unity in his thinking, he will find that his pupils cannot do it for him. (**2**: 274)

Conversational method wastefully used in pedagogical discussions.—Some of the best examples of the enormous waste that sometimes characterizes the conversational method are found in the discussions in classes which are studying education. For example, I visited a class of graduate students which was discussing methods of teaching music. They became sidetracked on some point concerning the perception of tonal differences. Nobody in the class, including the teacher, really had any reliable knowledge about the matter. Yet they spent forty-five minutes debating it vigorously, although they were no nearer the truth at the end than at the beginning of the discussion. After the class was over, I went to the library, took down from the shelves a book on the "Psychology of Tone Perception," looked up the topic in the index, turned to the appropriate page, and found in three minutes the experimentally determined answer to the question upon which thirty adults had each wasted forty-five minutes of debate — a total of one thousand three hundred fifty minutes, or twenty-two and one-half hours, of human time.

Legitimate uses. *Conversational solution of problems valuable if properly controlled.* — In spite of the obvious dangers which beset the use of the conversational method, it has certain very legitimate uses. As suggested above, its best place is in the reflective solution of problems which the teacher has thoroughly mastered and for which the children possess the necessary data in their past experience. In such cases the important things for the teacher to keep in mind are the following: (1) To avoid being sidetracked. (2) To avoid spending too much time in an endeavor to get the class to discover a point. In order to preserve the balance of relative values the teacher should give some points outright or after a brief endeavor of the class to discover them. (3) To adapt the pace to individual differences in capacities, not holding up the bright pupils too long or hurrying so fast that the slow have no chance to contribute.

Conversational assignments important aids to study. — Another place where the conversational method is especially valuable is in assigning lessons to be studied. In the case of reflective thinking it serves to get the problem in mind, to get started upon its solution, to anticipate and eliminate some of the chief difficulties, and to arouse curiosity to pursue the matter farther. In the case of acquiring habits of enjoyment it serves to give the necessary emotional setting which will be conducive to responses of enjoyment. In the case of training in expression a preliminary conversation may be very effective in getting students aroused to the point of being desirous of expressing themselves. It also aids in getting topics defined and even in getting freshly in mind the more formal phases of technique, such as outlining, paragraphing, etc. Care in the making of such conversational assignments is a most important factor in good teaching in many subjects. In order that it may be most effective, the assignment should be followed immediately by a period of supervised study (cf. p. 415).

Conversational methods in learning foreign language.— Conversational methods have a large place in the teaching of a foreign language, but since a special chapter has been devoted to the learning of a foreign vocabulary by the direct method, no further discussion is necessary (cf. p. 122).

Conclusion of discussion of conversational methods.— This will conclude our discussion of the conversational method, which, as we noted above, is considered by many teachers to be the most effective of all methods. While it may be effective when properly administered, it is relatively uneconomical in high school as compared with the method of interpretative recitations and discussions based on assigned readings and lectures. It is especially useful, however, in the reflective solution of problems for which students already have adequate data. In such cases the activity should be fairly direct; elaborate circumlocutions should be avoided. The conversational method is also especially valuable in assigning certain types of lessons to be studied.

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CHAPTER XIX

LABORATORY METHODS

Main points of the chapter. 1. Laboratory methods provide new real experiences as the basis for acquiring information or motor skill, or for carrying on reflective thinking.

2. Teachers should exercise special care in selecting laboratory manuals that provide experimentation which is related to the general issues of practical life and to the interests of high-school students.

3. The laboratory method is often a very uneconomical method of learning, and the substitution of lecture demonstrations for individual experimentation is often justified.

4. Skill in manipulation is relatively unimportant in most forms of high-school laboratory work.

5. For training in reflective thinking, laboratory exercises should grow out of problems raised in discussions, and should not consist merely of following recipes or set directions.

Laboratory methods may secure information, reflective thinking, and skill. — Laboratory methods provide the subject matter of instruction in the form of real present experiences for students. This practice contrasts with the previous methods which we have considered, in which the subject matter was derived from books or from the teacher, or from the *past* real experiences of students. In the laboratory, real experiences are provided primarily for three purposes; namely, (1) for information secured through observation, (2) for the experimental solution of problems guided by reflective thinking, (3) for the acquisition of skill in manipulation.

1. Securing information through observation is predominant in the study of the structure of plants and animals in biological laboratories. It is also prominent in many processes

in chemical laboratories—for example, in learning what kinds of precipitates are formed with various solutions of salts and acids.

2. The reflective solution of problems by experimentation is present in the study of problems in physics (for example, in work with pulleys) and in chemistry (for example, in qualitative analysis of unknown compounds).

3. Acquiring skill in manipulation is prominent in the biological sciences in dissection, and in chemistry in the construction of apparatus and the management of such processes as precipitation, drying, weighing, distillation, etc.

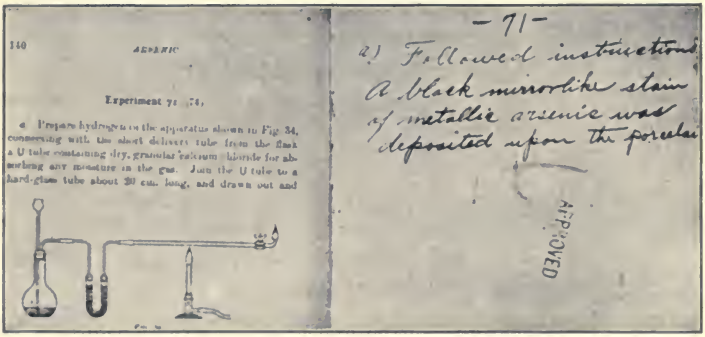
All of these purposes (namely, acquiring information through observation, solving problems, and acquiring skill in manipulation) are prominent in domestic science — for example, in the making of bread.

Individual laboratory work a recent development. — Historically the extensive adoption of individual laboratory work in high schools is a matter of relatively recent development. For example, concerning the introduction of laboratory exercises in physics Kester says:

> The laboratory feature of the secondary-school treatment was not introduced until late in the seventies; . . . very few high schools pretended in 1880 to give any laboratory instruction to their students. Yet something of the spirit of the laboratory must have been in the air in those days, for when Gage's "Elements of Physics" appeared in the early eighties, fairly well imbued with the idea of individual experimentation, it acquired wide use and influence largely because of this feature. It was about this time (1886 by actual record) that Harvard College began to lead the colleges and universities of the country by an entrance requirement of laboratory instruction. The innovation was made in a very radical manner. . . . The emphasis was laid almost wholly on laboratory instruction, with little apparent recognition of the fact that the outlook on the science, got from laboratory work alone, must be somewhat fragmentary; there was not available the amount of time necessary for the large number of individual experiments

which would cover the field satisfactorily. The change was too radical indeed; in 1897 Harvard modified its specifications as to the form of elementary physics which it would recognize, laying more stress upon text discussions and lecture demonstrations. (**4**: 151)

This quotation shows the recent development of laboratory work in high-school physics, and the influence of college-entrance requirements upon that work. A similar situation and development would be found to a considerable extent in the other sciences. The quotation also suggests the danger of abuse and overemphasis of laboratory exercises, which will be considered at greater length at other points in the chapter.



140 ARSENIC

Experiment 71 (74)

a. Prepare hydrogen in the apparatus shown in Fig. 34, connecting with the short delivery tube from the flask a U tube containing dry, granular calcium chloride for absorbing any moisture in the gas. Join the U tube to a hard-glass tube about 20 cm. long, and drawn out and

– 71 –

a) Followed instructions.
A black mirrorlike stain
of metallic arsenic was
deposited upon the porcelai

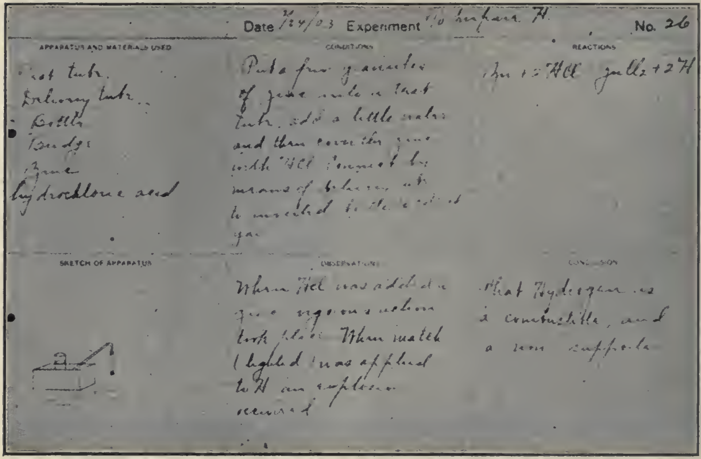
APPROVED

FIRST TYPE OF LABORATORY NOTEBOOK IN CHEMISTRY

Approved report contains bare statement of results

Exercise care in selecting laboratory manual.—The character of the laboratory instructions which an inexperienced teacher gives will depend to a large extent upon the nature of the textbook and the laboratory manual which he uses; hence great care should be exercised in choosing the latter, and the same methods should be followed as were described for the choosing of textbooks on page 421. The high-school teacher should avoid especially the danger of using the same type of manual as he used when a student in the university classes. Some of the chief defects of high-school laboratory work have been due to the practice of carrying the highly specialized laboratory exercises of the university down into the courses for young students in high school.

The accompanying illustrations show four methods of writing up the results of experiments. The relative values of the four methods and other related questions are discussed by Greer in an article on the teaching of chemistry in high schools, from which the illustrations are taken (**3**).



Date 1/24/03 Experiment To prepare H. No. 26

APPARATUS AND MATERIALS USED

Test tube.
Delivery tube.
Bottle
Bridge
Zinc
hydrochloric acid

CONDITIONS

Put a few granules of zinc into a test tube, add a little water and then cover the zinc with HCl. Connect by means of delivery tube [illegible] to [illegible] gas

REACTIONS

$Zn + 2HCl = ZnCl_2 + 2H$

SKETCH OF APPARATUS

OBSERVATION

When HCl was added to zinc vigorous action took place. When match lighted was applied to H an explosion occurred

CONCLUSION

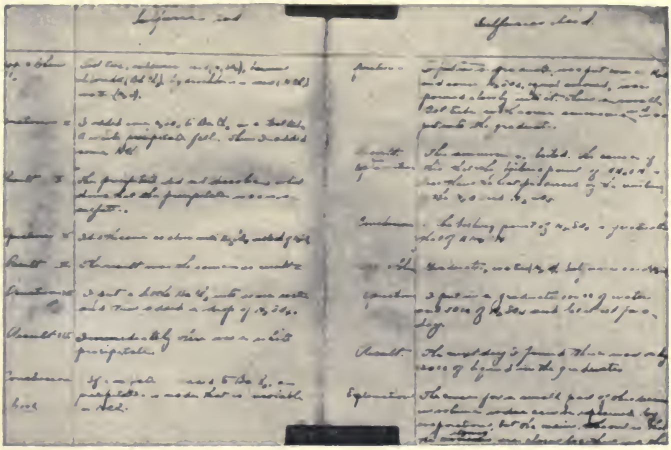
That Hydrogen is combustible, and a non supporter

SECOND TYPE OF LABORATORY NOTEBOOK IN CHEMISTRY

Page subdivided for six phases of the report

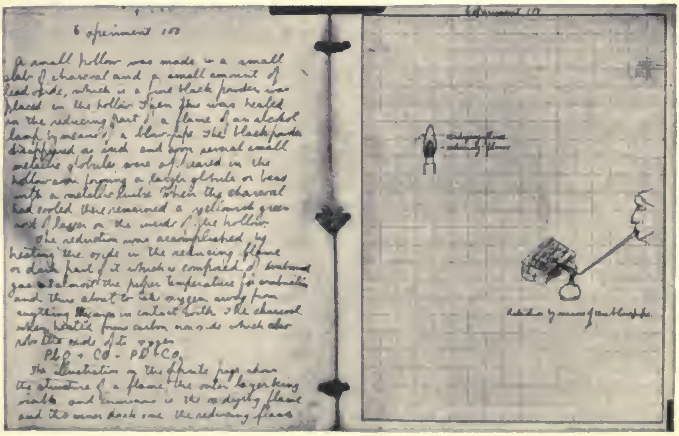
Sample suggestions concerning laboratory instruction.—In some of the books which deal with the teaching of the special sciences, suggestive directions for the organization of laboratory work are found and should be read by prospective teachers of the subjects in question. As a brief example I quote the following from Mill's discussion of the teaching of chemistry:

> *Suggestions as to laboratory work.*— 1. The laboratory course should be designed to increase the pupil's interest in his work, to



THIRD TYPE OF LABORATORY NOTEBOOK IN CHEMISTRY

Topical report required as in the second type



Experiment 100

A small hollow was made in a small slab of charcoal and a small amount of lead oxide, which is a fine black powder was placed in the hollow. Upon this was heated in the reducing part of a flame of an alcohol lamp by means of a blow-pipe. The black powder disappeared as [illegible] and upon several small metallic globules were appeared in the hollow soon forming a larger globule or bead with a metallic lustre. When the charcoal had cooled there remained a yellowish green [illegible] of layer on the inside of the hollow.

The reduction was accomplished by heating the oxide in the reducing flame or dark part of it which is composed of carbon gas at almost the proper temperature for combustion and thus about to take oxygen away from anything that is in contact with. The charcoal when heated forms carbon monoxide which also robs the oxide of its oxygen.

$PbO + CO - Pb + CO_2$

The illustration on the opposite page shows the structure of a flame the outer layer being visible and luminous is the oxidizing flame and the inner dark one the reducing flame

Experiment 100

FOURTH TYPE OF NOTEBOOK IN CHEMISTRY

Independent formulation and interpretation by the student increase his power to *see*, *think*, and *do* for himself, and to make him acquainted with the chemicals, methods of manipulation, reactions, and laws at first hand.

2. Have the pupil keep a laboratory notebook, and insist on *the use of reasonably good English*, on *neatness*, and on *clearness*, and *that all entries shall be made when the experiment is performed.* Full directions, some explanations, and questions are useful in the laboratory manual, but strictly guiding subheads are to be avoided. A loose-leaf system is an advantage.

3. The attention of the teacher must be given repeatedly to each individual student while in the laboratory.

4. Some problems should accompany the course in chemistry. These problems should always be practical and should be made more of a laboratory than a classroom exercise.

5. Do not have much exact measurement. A student may measure a thing exactly and know nothing about it; in fact, his mind is easily diverted from the real problem to the mechanical details of the measurement. Some science courses have been aptly called "starvation courses in measurements."

6. Sacrifice some of the experiments in the book for some more nearly "homemade." The added interest will repay the trouble.

7. Make the student think, but do not expect him to rediscover chemical laws or to prove them. A little consideration of *any* law will probably show you that you could not, if turned loose in the best chemical laboratory in the country, prove the law in six months. Let the experiments illustrate the laws; they will help the student to remember and to understand them.

8. Sometimes the student gets more results than he can take care of. He may not select the one that you had in mind. Do not expect him always to draw *your* conclusion *without your assistance* from an experiment assigned by *you*. (**7**: 194–195)

Principles of previous chapters apply. — Most of the problems concerning the conduct of laboratory work fall under the general principles of instruction which we considered in previous chapters. The most important of these principles for our present purpose are those concerning (1) the selection of subject matter, (2) economy in management, (3) acquiring motor skill, (4) reflective thinking. We shall discuss briefly the application of these principles to the conduct of laboratory exercises.

Adapt laboratory exercises to broader social needs. — The adaptation of the subject matter of laboratory instruction to the contemporary social needs of the various classes of students to be found in high schools would necessitate relating the experimentation very definitely to processes that play a large part in the practical affairs of ordinary people. In botany and zoölogy this would eliminate a large amount of the study of structure that has been so prominent in the past, and would lead to an emphasis upon the conditions of growth, physiological conditions, and the propagation, care, and uses of the plants and animals. In physics it would result in the emphasis upon experimentation with machines, with simple electrical devices such as bells and telephones, with practical applications of heat, etc. In chemistry, emphasis would fall upon the reproduction in miniature of important industrial processes. In all of these sciences the relations to agriculture often furnish important points of contact. In domestic science there is at present little danger of the experimentation being unrelated to social needs, although in some schools a student is required to struggle through several relatively unrelated courses in chemistry and other sciences before she is permitted to begin any experimental manipulation of food materials.

Exercise care in selection from superabundance of material. — The problem of relative values as applied to the teaching of science has already been illustrated in the choice between quantitative and qualitative studies in physics (see above, p. 71). To be sure, the use of the instruments of measurement employed in physical research would have some value for students, but the greater value of other activities is suggested by Hoadley in the following quotation :

> With a superabundance of excellent material within the scope of elementary physics, there would seem to be no valid reason for

> spending the first days in the laboratory on manipulation and measurement with vernier and micrometer calipers, the diagonal scale, the spherometer, etc., as is sometimes done with no physics in sight.
>
> The more simply and directly a physical problem is presented to the pupil the better, that his thoughts and attention may not be diverted from the real point at issue. This principle is especially applicable in the early part of the laboratory course, where it is most frequently and most seriously violated by the use of micrometric instruments, the Jolly balance, etc., in the work on density and specific gravity, even before the pupil has had practice in the simpler methods of measuring and weighing. It would seem as if the express purpose of such work were at the outset to throw as many obstacles in the way of progress in physics as the ingenuity of teachers and instrument-makers could devise.
>
> Perhaps the most striking illustration of what should not be done in this respect is afforded by the familiar quantitative experiments on the breaking strength of wires and on elasticity of stretching, bending, and twisting. These experiments lead absolutely to nothing in most high-school courses. The laws with which they deal are, for the most part, not considered in elementary textbooks. (**10**: 15–16)

The same type of argument would apply to all the other sciences in which there is an equal superabundance of material with equal necessity of exercising care in the selection of laboratory exercises that are relatively the most valuable.

Relate experimentation to a few large topics or problems. — The desirability of emphasizing a few large topics in experimentation is set forth by Mann as follows, with particular reference to physics:

> Experience has taught us that the average teacher of physics is liable to err in requiring the class to study too many topics and do too many experiments. The result of such an error is that the pupils become confused and also acquire careless habits in the use of the apparatus and the making of measurements. (**4**: 175)

Not only is there danger of developing poor habits of experimentation when there are so many experiments, but there is danger that the thought aspect of the work will be neglected altogether and the laboratory activity become a mere matter of hurried manipulation.

Adapt to needs, interests, and capacities of students.—The arrangement of the subject matter for laboratory work in terms of the needs, interests, and capacities of the high-school students has already been emphasized in the discussion of the course in general science on pages 85–92, and need not be further elaborated here.

Economy would often justify substitution of lecture demonstrations. — The second general principle which has an important bearing upon laboratory teaching is the principle of economy in classroom management. The application has already been made on page 35. Apart from the matter of economy in arrangement and manipulation of materials, however, there is always a larger question of economy; namely, whether the same real experiences could not be given more economically and effectively by having the teacher or a committee of capable students demonstrate the experiments before the class. In many cases, where observation and reflective thinking about real situations is more important than acquiring skill in manipulation, the demonstration is much superior to individual laboratory work. The time that is used by individual pupils in setting up apparatus could often be used to much greater advantage in reflective thought based on observation. In emphasizing this point Thorndike says:

> Like any reform in education, the laboratory method has suffered at the hands of its friends, by being used indiscriminately and by being overused. It is not scientific to spend two hours in learning by manipulation of instruments something which could be better learned in two minutes by thought. Washing bottles, connecting electric wires, and putting away test tubes, though doubtless useful tasks in connection with scientific housewifery, are not magical sources of intellectual growth. Nor is it safe to disregard *what* is taught, so long as it is taught as an exercise in scientific method.

A laboratory should teach facts important in themselves. It is disastrous to scientific habits in the young for them to find repeatedly that elaborate experimental work brings at the end some trivial or meaningless result. (**9** : 178)

Avoid highly specialized forms of motor skill. — The acquisition of skill in manipulating special forms of apparatus and special materials is important in some sciences for some pupils, but not so important in others. Thus, the manipulation of dough for bread or for pie crust is an important factor in learning how to make these materials, which is one of the important aims of the laboratory work in domestic science. In other cases, however, the type of manipulation required in the laboratory is so highly specialized that it will probably not be used by many of the students outside of the classroom — for example, bending and blowing glass, which is a factor in chemical laboratories, and dissection, which is a factor in biological laboratories. It is a mistake to overemphasize in high school such laboratory exercises as require a type of manual skill that will seldom be used elsewhere by most of the students.

Student's understanding may greatly exceed his skill. — Furthermore, a student may understand the principles of a machine or of the operation of a piece of apparatus and still be very deficient in ability to manipulate them. For example, in college I succeeded fairly well in the theoretical part of a course in organic chemistry, but the apparatus which I constructed for making organic preparations was the laughingstock of the laboratory. Similarly, I had no difficulty with the principles and problems of magnetism and electricity, but a dynamo was always for me simply a terrible, confused tangle of wires, the actual construction of which I never mastered.

Principles of practice require careful supervision of manipulation. — If certain forms of motor skill are to be acquired in the laboratory, however, the general principles laid down in Chapters VI and VIII on motor skill and practice should be applied. It is especially important that the teacher give all the time that he possibly can to getting individual students started right in their construction, dissection, or drawing. This is important not only from the standpoint of avoiding the beginning of bad habits but also from the standpoint of saving the student's time. The laboratory teacher should be especially skilled in making suggestions and asking questions. He should be present and actually instructing individuals all the time. We need the same corrective for unsupervised, undirected laboratory work as is involved in the substitution of supervised study for home study. The same type of skill in teaching is required for the proper supervision of laboratory work as for the supervision of individuals who are studying (see p. 412).

For reflective thinking laboratory exercises must grow out of problems. — The consideration of laboratory methods from the standpoint of the extent to which they involve reflective thinking by the students is the most important aspect of the topic, since laboratory exercises are supposed to contribute essentially to the reflective, scientific study of the subject in which they are found. That laboratory exercises commonly fail to do this is asserted by Dewey in the following quotation:

> A student may acquire laboratory methods as so much isolated and final stuff, just as he may so acquire material from a textbook. One's mental attitude is not necessarily changed just because he engages in certain physical manipulations and handles certain tools and materials. . . . This problem of turning laboratory technique to intellectual account is even more pressing than that of utilization of information derived from books. Almost every teacher has had drummed into him the inadequacy of mere book instruction, but the conscience of most is quite at peace if only pupils are put through some laboratory exercises. (**1**: 125)

Following recipes is not scientific experimentation. — If a teacher will consider for a moment the part played by experimentation in scientific procedure, he will realize that the ordinary laboratory exercises do not bear anything like the same sort of relation to the student's thinking. In scientific investigations the scientist who is at work upon some problem advances some theory or hypothesis to solve it, and in order to test or verify the hypothesis sometimes devises experiments which will do so. That is, he says, "Probably such and such a factor is the one I am searching for; let me produce it under certain definite controlled conditions and see if the expected results follow." How different this general process is from the activity of the student who is carrying out certain directions for manipulating apparatus and materials, just as a cook would proceed to follow a new recipe. Like the cook the student acquires some information and some skill in manipulation; but if he is to do any scientific thinking, his laboratory practice should develop as a means of assisting in the solution of problems.

Freely merge discussion, laboratory exercises, and interpretation. — Obviously, high-school students cannot be expected to discover the hypotheses and the experiments for verifying them that it took expert scientific specialists years to discover. It is possible, however, to introduce laboratory exercises in a way that will require more reflective thinking than commonly occurs in the ordinary recipe-following method. A suggestion of how this may be done in physics is contained in the following quotation from a discussion by Professor Mann.

> It is generally better to introduce a topic by means of informal discussion with the class concerning familiar experiences. For example, if the topic is specific gravity, the knowledge already in the possession of the class should first be called forth by means of questions concerning their experiences with floating and sinking of such familiar things as their own bodies, chips, corks, logs, cream, ice, stones, nails, lead keels, fishing sinkers, etc.
>
> When the principle or idea under discussion has been brought out by such discussion, it should be defined or demonstrated by one or more experiments and then fixed by requiring the solution of a number of simple, real, concrete problems. If the class work

has been skillfully conducted, a number of problems or disputes will have arisen of a sort that can be settled only by making experiments and measurements.

The laboratory is the place in which to settle such problems and disputes. In the ideal case the results of each laboratory experiment will solve some problem or settle some dispute, and the more concrete and significant the problem or the dispute, the greater the value of the work. For example, the pupils will probably get much more valuable training from the laboratory work in specific gravity if they be shown first a rectangular block of oak and be asked who can predict how high it will float out of the water, than if the experiment is presented in the usual way, namely, " Find the specific gravity of a rectangular solid body lighter than water." In the first case a problem is presented, measurement is required for its solution, and the competitive sense is appealed to; in the second case there is no problem that has any significance to the pupils.

When the laboratory is used as a court of appeal where disputed points can be settled, the work there helps to fix in mind and to clarify principles, besides giving discipline in scientific thinking; but when it is used merely to determine the specific gravity of a body heavier than water, or that of a body lighter than water with a sinker, or of a liquid with a pycnometer, or of a liquid by Hare's method, etc., the work tends to give training in little besides the technique of the physicist. The work of the high school is to educate boys and girls, not to train research physicists.

Since the laboratory is the place to solve problems that cannot be solved without experiment and measurement, the most fruitful type of experiment is the one whose result is not known in advance. The attempt to determine physical constants whose values are known with far greater accuracy than it is possible to hope for in an elementary laboratory is, to say the least, discouraging. Thus, the theoretical mechanical advantage of an inclined plane or of a set of pulleys is known in advance; but the actual efficiency of a given plane or pulley is not known but depends on how the machines are handled. If the student is asked "What is the greatest efficiency of this inclined plane? Is it greater with large load or with small load?" he will probably get far more real training from his work than he will if asked to " verify the law of

> the inclined plane." In the former case he has a problem to solve, and the solution depends on what he is able to make the plane do; in the latter case he has to make his results tally with the theory.
>
> Other similar problems that lead to significant and valuable laboratory work are: What is the maximum efficiency of a small water motor? Which kind of gas burner is most efficient on cook stoves? Which boy's electric motor is most efficient? How much more efficient is a tungsten lamp than a carbon lamp? What kind of lens shall I get for a camera for making pictures for lantern slides? (**4**: 171–173)

This quotation suggests the desirability of closely connecting the laboratory exercises with the general class discussion of a topic. Where it is possible to administer it, the discussions, laboratory exercises, and further interpretative discussions should merge into each other freely. If this is done, the experimentation can be arranged at the psychological moment instead of falling upon separate laboratory days. Such close correlation of discussion and experimentation does not mean that the teacher would put the class to work on exercises without having the laboratory materials definitely prepared and in order. It does mean, however, that definitely planned discussions, which raise certain definite problems, would precede the definitely planned laboratory exercises, and that the first ten minutes of a period might be spent in discussions, the next twenty minutes in experiments, and the next ten minutes in further interpretative discussions. Sometimes these discussions might be carried on with the whole class, sometimes with a small group while the rest of the class continued experimenting, and sometimes with individuals.

Apply previous chapter concerning acquiring abstract ideas. — Sometimes laboratory exercises are arranged primarily to acquaint students with certain phenomena as the basis of understanding new abstract terms, such as *acceleration*, *acid* and *base*, *osmosis*, etc. In such instruction the general principles discussed in connection with the acquiring of abstract and general ideas should be applied and should be reviewed at this time (see pp. 205–225).

Conclusion of discussion of laboratory methods. — This will conclude our brief discussion of a few aspects of the laboratory method. The general enthusiasm for laboratory work has often blinded teachers to the fact that it commonly wastes a great deal of time in processes of routine manipulation which give the students little useful information and no training in scientific thinking. If the latter are to be secured, the experimentation should grow out of discussions of problems that are related to practical issues in the world at large, and interpretative discussions should be closely connected with all experiments and observations.

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EXERCISES

For problems for class discussion of Chapter XIX, see *Exercises for "Methods of Teaching in High Schools,"* pp. E 235–E 240.

FINAL EXAMINATION

For suggestions for the conduct of the final examination in a course using this textbook, plus a list of 150 pages of the text which might well be reviewed for such an examination, see *Exercises for "Methods of Teaching in High Schools,"* pp. E 232–E 234.

CHAPTER XX

THE ART OF QUESTIONING

Main points of the chapter. — 1. Skilled questioning demands of the teacher clear and rapid thinking, a keen sense of relative values, and ability in wording questions.

2. Many points in the technique of questioning depend upon regarding the recitation as primarily a place for group thought, not as a place for the pursuit or prolonged assistance of individual students.

3. For routine drills, such as those in algebra and the study of a foreign language, devices should be adopted that will speed up the process, while for recitations involving reflective thinking, slow, thoughtful questioning should prevail.

4. In general, teachers should avoid practices in questioning that do not place a premium upon concentrated attention by all members of the class. Many devices and mannerisms come under this head.

A few special points of technique to supplement previous principles. — The art of questioning is an important factor in all types of recitations as well as in the directions prepared as guides to studying or to the interpretation of laboratory exercises. In conversational methods skilled questioning is the most important element in securing educative results, while in recitations based upon assigned readings there are large opportunities to secure superior results through skilled questioning which stimulates interpretation, evaluation, and application of the points studied in the assignments. Skill in questioning will depend to a very large extent upon the efficiency with which the teacher applies the general principles previously discussed, but there are a few special points of technique which we shall discuss briefly in this chapter.

The use of questions to test whether students have prepared or mastered certain material may be distinguished from questioning which is intended to stimulate and guide their thinking along new lines. To do either of these well requires special skill. The principles governing the stimulation and direction of reconstructive thinking by students have been thoroughly discussed, particularly in the chapter on reflective thinking and in the one on self-activity and apperception. The special technique of testing will be discussed in a later chapter. In view of these facts we shall not provide here special discussions from each of these points of view.

Skilled questioning demands rapid adaptation on part of teacher. — A teacher who is conducting a recitation is in a very complicated situation and is adapting his responses to a great many rapidly changing elements. This is true even when he is merely conducting an oral quiz to determine whether assigned readings have been mastered. The situation is vastly more complicated when he is conducting a recitation that permits or requires a large amount of reconstructive or original thinking by the students. He never knows just what move to expect; hence he must be constantly alert and quick to devise appropriate questions.

Pedagogical experts are apt to be overcritical of the questioning that is done in recitations which they have observed. From the calm and peaceful positions in their pedagogical armchairs they show how it could have been improved in this way and in that. Such criticisms often fail to take account of the complicated series of rapidly shifting responses which a teacher has to give if he is really making the lesson go. Speaking as one who has never been able to develop any inside feeling of self-possession before a class, I would say that much of the questioning which is held up to severe criticism when viewed in a stenographic report appears to me to be very good when considered in the light of the rapid shifting of attention and emphasis that the teacher was required to make as the responses of the students came forth. Such a view, however, does not justify regarding questioning carelessly, but, on the contrary, tends to emphasize the necessity of the most careful study of the art of questioning.

Requires clear thinking, sense of relative values, and skill in wording questions. — Among the chief elements at the basis of a teacher's success in questioning are the following: (1) clear and rapid thinking, (2) a constant feeling for relative values, and (3) skill in expression, particularly in wording questions.

1. *Clear and rapid thinking.* — *Clear* thinking in a given line may be attained by many teachers if they become sufficiently well acquainted with the subject. Unfortunately, however, some persons always remain muddled, tangled thinkers, no matter how much they know; they always fail to make clear-cut distinctions, comparisons, and classifications. As a consequence they will always be relatively poor questioners. When we add *rapidity* to the requirement of clearness in thinking, many more persons are eliminated from the possibility of achieving great success in conducting recitations. *Slow, clear* thinkers might prepare excellent written questions or directions for studying or for interpreting laboratory exercises, but in many recitations they would get relatively poor results.

2. *Sense of relative values.* — A keen sense for relative values enables the self-possessed teacher to determine quickly, with a nice discrimination, just what use to make of each answer or response given in a recitation. Shall it be emphasized and followed up, or merely accepted but passed over, or criticized but modified so as to lead on to something more valid? Here again thorough knowledge of the related field helps in achieving success, though many fail who have vast knowledge but little sense of relative values and possibilities.

3. *Skill in wording questions.* — Skill in expression is especially important in the wording of questions. A teacher

may have the other two qualifications, namely, rapid, clear thinking and a sense of relative values, and fail to word questions well. A person may even be an excellent lecturer and still be a poor questioner, which shows that skill not merely in expression but in a special kind of expression, namely, the wording of questions, is necessary. Such skill requires not only clear thinking and a good command of language, but also the ability to estimate quickly just what is the condition of the student's mind and just what stimulus is needed to set it operating in a certain direction.

Thus we see that skill in questioning in recitations requires all of the preparation and alertness that a teacher can bring to bear upon the situation. Preparation can easily be provided for, but alertness is more a matter of fundamental temperament, though it can be cultivated to a certain extent. Preparation of questions in advance of the recitation is one of the chief points in the planning of lessons; this will be discussed in a later chapter.

The recitation as a place for group progress determines technique. — Several of the special points of technique in questioning depend upon regarding recitations primarily as periods for *group* thought and *group* progress, the periods of supervised study being primarily the places for *individual* thought and progress and for assisting individual pupils in their peculiar difficulties. If this distinction is kept in mind, a number of detailed considerations may be easily disposed of.

Address questions to the group. — In the first place, questions should be addressed to the whole group, and the whole group should be expected to take an interest in replying and endeavoring to get ready to reply. The opposite condition is very common, where each question is addressed to an individual pupil whose name is given before the question is asked. Thus, in college and high-school classes many teachers, who are quite proud of themselves but who have no correct ideas of method, proceed as follows: "Now, Mr. Smith, what is the difference between," etc. Mr. Smith then braces himself for the attack, while the rest of the students look on and enjoy his discomfiture, with no thought that they are responsible for thinking up answers to the questions addressed to poor Smith. Needless to say, the question should be propounded, then sufficient time given for part of the group to get the necessary thinking done, and then some student called upon to answer.

Do not call upon students in fixed order. — The same principle would rule out the practice of calling upon students in a fixed order. Yet many instructors follow the order in which students are seated, or in which the names come in a class list or upon class cards. If the teacher can't do any better, he can at least put the names on cards and shuffle these before each recitation. This will provide a definite chance basis until a number of students have been called upon. Occasional calling upon some of these for a second time during the recitation would tend to keep students from relapsing after they have had their first turn by chance.

Secure fair distribution of questions by some device. — Furthermore, in order that all members of the class may feel that they are expected to participate at all stages of the recitation, the teacher must take care to avoid calling upon a few students too often and neglecting others. Unless the teacher is especially self-possessed or adopts some device which specifically checks this tendency, it is difficult to avoid it. For example, Breslich reports that a college student who was observing mathematics classes in a high school was

> directed to keep a record of the number of times each pupil of a class was called upon to recite during a number of days, omitting recitations where all pupils went to the blackboard or where the whole class was called on to recite in order. It was found that in a first-year class of twenty-two pupils one student recited [that is, was called upon to recite] only *twice*, and another *eleven* times, in nine days. . . . In a first-year class of thirteen pupils one pupil was

questioned only *four* times and another *eighteen* times. In a second-year class of fifteen pupils the range was from *six* to *twenty-three* recitations during ten days. (**7**: 153)

Personally I have considerable difficulty in avoiding this tendency to see some students and to overlook others. My best device for avoiding it is to look over my list of students when I am preparing for the recitation, and to make written note of those that ought to be called upon. If this memorandum is kept in sight during the recitation, it tends to remind me to distribute the questions properly.

Do not waste class time assisting or pursuing individuals. —As noted above, the time of the class should not be wasted while the teacher helps a slow pupil who has some peculiar difficulty. This assistance should be given during a period for supervised study. Similarly, class time should not be wasted while the teacher pursues an individual student with questions. If it is a small difficulty which is delaying a student who might otherwise continue his recitation satisfactorily, let some other student or the teacher help him out with a word. In violation of this rule I have seen a most capable teacher delay a whole class for five minutes while he tried to elicit an answer from one student. Despite the frantic appeals of all of the other students to be permitted to recite, the teacher said, "No, let James get it," sincerely believing that this was a fine exhibition of true pedagogical skill instead of its being just the opposite.

Adapt commendation and reproval to individual differences. — The proper distribution of commendation and reproval for the answers of individual students calls for fine discrimination and tact on the part of the teacher. Thus, a purely impersonal remark such as "That 's the point," coming after a puzzling discussion of a difficult question, may be treasured by a conscientious, timid student for a long time and stimulate him to further endeavor. while in the case of a slow, conscientious, sensitive student who has missed the point of a question such an off-hand remark as "Wake up" may rankle for hours. On the other hand, a lazy, callous student may require severe reproval. For example, I heard an instructor appropriately stimulate a lazy, inattentive student who had given a careless answer, by saying, "Mr. Smith, what was the question I asked you? Now, what relation does your answer bear to the question? What was the general point which we were discussing before I called on you? That will do; sit down and see that you keep track of the discussion hereafter." Smith needed about as vigorous a reminder as could be given him, and his temperament was such that no hard feelings were created by the teacher's rebuke. Thus we see that large consideration should be given to individual differences in bestowing commendation and reproval. In many cases nothing more is needed than perfectly objective evaluation of the answers given. This evaluation may be determined by their acceptance or rejection by the teacher or by the class. If we accept the point of view expressed by Dewey, quoted above on page 202, acceptance or rejection by the teacher should play a smaller part than it commonly does in recitations, and greater emphasis should be placed upon having the class determine the value and validity of answers and suggestions.

Rapid pace for drill questions; slow pace for thought questions. — The number of questions asked and the amount of time given for answering vary with the nature of the mental activity which is being carried on. In the case of oral drills on vocabularies and on short, abstract problems in algebra the pace should be very rapid. In the case of reflective, analytical study of a question in civics or chemistry the pace should be very slow. There is room for improvement in both types of exercises. In rapid drills the use of flash cards as described above on page 160 provides for great improvement. In the case of reflective thinking the necessity of a slower pace is emphasized by Miss Stevens, who has specialized upon the investigation of questioning. She says:

> If the purpose of the question is to provoke thought and evoke expression, can the result be other than negative when a teacher of history in one class period of forty minutes asks one hundred and fifty questions and gets one hundred and fifty answers, with an average of more than three questions and three answers per minute? With such breakneck speed what chance can there be for assimilation or association of ideas and for orderly expression? (**4**: 7)

Repetition in questioning. *As a general rule avoid repetition of questions.* — In order to avoid inattention, questions should not be repeated, as a general rule, if they are well worded in the first statement. Sometimes, however, the teacher can tell, from the general puzzled expression upon the faces of even the most attentive members of the class, that the question has not aroused the response expected. This may be due to the fact that the form of the question is poor. In view of the difficulty of wording good questions this is likely to happen now and then during the stress of a recitation. Under these circumstances the best thing to do is to repeat the question in an improved form. Sometimes, if the initial form of the question is good but the question is very difficult, the teacher may repeat it without modification, just as a lecturer repeats an important statement that he wants to emphasize or as a person rereads a difficult sentence in a book in order to get its full meaning. Obviously such repetition should be avoided in easy routine questioning that calls for little reflective thinking, and it should be infrequent in all questioning.

Repetition of pupil's answer by teacher is a bad mannerism. — Many teachers fall into the habit of repeating the answers given by students; this is a harmful mannerism and should be corrected. Very often it is largely a case of thinking out loud; that is, while turning the answer over in mind the teacher repeats it automatically, at the same time getting ready for the question that is to be based upon the repeated answer. This also tends to give the discussion a somewhat more continuous appearance, since the waits which usually occur while the teacher thinks up the next question are filled by his automatic repetition of the preceding answer. To avoid the danger of encouraging the students to be inattentive to the one who is answering, however, the teacher should refrain from repeating the answers. In rapid routine questioning the waits are or should be eliminated by the speed of the process, while in reflective questioning and thinking the waiting and pondering by both pupils and teacher are appropriate if all are seriously concerned with the problem in hand.

Yes-or-no questions to be avoided unless reflective attitudes prevail. — It is sometimes stated that questions which can be answered by *yes* or *no* should be avoided. Like many of the other conventional rules concerning questioning, this rule is based upon the general conception that questioning is used only to test a student's knowledge, and upon situations in which the teacher is trying to trap the student and the student is skirmishing to avoid being caught. In reflective questioning and discussion in high-school and college classes the yes-or-no question is very commonly used effectively if accompanied by the question, Why? or by the direction, "Give reasons for your answer." For examples turn to pages 172 and 210 and examine the questions quoted there from the textbook on economics, in which the instruction is given largely through questions. Many of the questions quoted are yes-or-no questions, but I think the general verdict would be that the effect of the questions is to stimulate a reflective consideration of the meaning of the topics under discussion; namely, of wealth and of the influence of specialization.

Conclusion of discussion of questioning. — In our brief consideration of the technique of questioning we emphasized as a fundamental fact the necessity of thorough preparation and alertness on the part of the teacher who expects to carry on effective questioning in such complicated social situations as rapid or thoughtful recitations present. To succeed, he needs clear thinking, a keen sense of relative values, and skill in expressing questions. The recitation should be regarded as primarily a place for group thought, and many of the details of the technique of questioning should be determined by this attitude. The pace should be adapted to the type of mental activity which is desired, and all practices which place a premium upon inattention should be avoided. Under this head come a multitude of specific precepts which thoughtful teachers should review occasionally and apply to their practice.

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EXERCISES

For problems for class discussion of Chapter XX, see *Exercises for "Methods of Teaching in High Schools,"* pp. E 241–E 242.

CHAPTER XXI

PRACTICE TEACHING AND LESSON-PLANNING

Main points of the chapter. 1. Practice teaching should be carefully administered to secure large profit from a small amount of practice.

2. The general principles of practice should be applied. The most important of these are the following:

a. It is desirable to secure a correct start; hence careful planning is necessary.

b. Distributed practice is better than concentrated practice.

3. Carefully written lesson plans should provide for the separate mastery of subject matter and method.

4. A carefully organized brief is a most important factor in mastering and organizing subject matter.

5. The writing out of pivotal questions is an important step in the method plan.

6. Thoroughly organized routine and mimeographed or printed directions facilitate the very difficult process of supervising practice teaching.

Practice teaching with adolescent pupils to be provided. — In order that prospective teachers may be trained to think of teaching in terms of sound principles of method, it is highly desirable that some practice teaching under expert supervision should be provided for students in colleges and normal schools who expect to teach in high schools. There is very little provision in America for such practice at the present time (1914), but it is being organized in a number of universities, and in a few decades we may expect to see much more adequate facilities. In normal schools, practice teaching is provided on a large scale for prospective elementary-school teachers, and the same type of arrangement should be made in liberal-arts colleges and universities for prospective high-school teachers. Most practice schools for such teachers should probably be organized to enroll pupils from about twelve to eighteen years of age, that is, during the period that is coming to be recognized as the proper period for secondary or adolescent education.

Prerequisites include training in subject matter and in education. — Owing to the limited facilities for high-school practice teaching that will probably always prevail, and to the desirability of administering the teaching as efficiently as possible, it should be restricted to college seniors who meet certain prerequisites. These should include several college courses in the subject to be taught, one of which is a course in the teaching of the subject that has been accompanied by observation in the high school. The prerequisites should also include certain courses in the department of education. Every practice teacher should be under strict supervision and should not be permitted to undertake to teach a series of lessons until it is clear that he is thoroughly prepared not only in general but also for the particular series of lessons and particular class that he is to teach. A class of high-school students is not material with which an irresponsible, unprepared individualist should be permitted to experiment. As indicated in the chapter on classroom management, there is ample scope for the expression of spontaneity, individuality, and reasoning within a well-controlled, routinized system (see above, pp. 27–31).

Emphasize judgment aspects more than routine aspects. — In connection with practice teaching we may utilize to advantage Bagley's distinction between the *routine* and *judgment* aspects of teaching, as we have already done in connection with classroom management (see pp. 26–27). The *routine* aspects — that is, the recurring and relatively unvarying details of management — are very important in securing economy of time and effort, but they can easily be mastered in a relatively short time by the teacher who has had his attention focused on the necessity of so doing. The *judgment* aspects are those teaching processes which are peculiarly concerned with directing the various types of learning so that they will proceed most economically and effectively. In contrast with the routine aspects the judgment aspects in practice teaching present a most varied and complicated series of ideas and principles of method to be mastered theoretically and to be used practically in the development of habits of teaching. It becomes evident from this contrast that the routine aspects could be mastered with comparative ease by a beginning teacher, although it might take several months to make the routine practices habitual. On the other hand, efficient application of the principles of learning in the instruction of various types of students calls for much greater skill and resourcefulness and requires a much longer period for mastery. This contrast should determine the relative emphasis in the organization of practice teaching. In the routine aspects the practice teacher should be given a correct start, as in any other kind of practice, but in the supervision the critic should not stress this phase to the neglect of the judgment aspects, which present a much larger range of possibilities with which to familiarize the prospective teacher. The emphasis should fall rather upon the methods of selecting, organizing, and presenting subject matter, of organizing proper practices in learning, of securing spontaneous interest and concentration of attention, and of supervising study suggestively without too much assisting, and upon methods of asking questions and actually conducting recitations of various types.

Apply general principles of practice. *Assure a correct start.* —The general principles of practice set forth in Chapter VIII should be applied to practice in teaching as far as practicable. The first principle that applies is the importance of securing a correct start. As far as possible the student should be prevented from beginning to use incorrect or wasteful methods. We have already noted the importance of this point from the standpoint of protecting the pupils who are being practiced upon, and we now reiterate it from the standpoint of effective training of the practice teacher himself. One of the most important factors in securing a correct start is careful planning, which will be discussed below.

Distributed periods of practice are better. — The next question in applying the general principles of practice to practice in teaching concerns the best distribution of the time that is available for each practice teacher. After practice teaching becomes the regular requirement for prospective high-school teachers, the facilities which can be made available will permit only a limited amount of practice by each student. Let us assume that it will be possible for him to teach only forty lessons. In view of the experimental data given above on pages 161–164, what would be the best distribution of these lessons? Would it be best to teach ten lessons a week for four weeks, or five lessons a week for eight weeks, or four lessons a week for ten weeks? When we consider the data on simple practice already referred to, and take into account the fact that the practice teacher commonly has to put in two or three hours a day in preparation for each lesson which he teaches, it is evident that the practice distributed over eight or ten weeks would be much more fruitful than the same amount of practice concentrated into four weeks. Probably even a wider distribution of the practice periods would be justified.

Establish desirable emotional attitude. — A third general rule of practice for the supervisor to apply is to endeavor to secure a favorable emotional tone on the part of the practice teacher. The elements of nervousness, worry, and fear of criticism should be eliminated as far as possible, and feelings of spontaneous interest, pleasure, and satisfaction in success stimulated. To secure these emotional conditions at the same time that he holds up high standards of attainment calls for great skill on the part of the critic teacher or supervisor.

Special type of skill needed for supervision. — The qualities and efficiency of the supervisor are most important factors in the successful training of practice teachers. It is not sufficient that he be simply a good teacher. He must have clear ideas concerning methods of teaching and be able to impart these ideas to others. The processes and responses which the beginning teacher must master are entirely too complicated and rational to be mastered merely by imitation. The student must have given to him not merely a good example but also a clear understanding of the controlling ideas and purposes, for he will not make much progress in the complications of his first year of regular teaching if he has only a few examples to fall back upon for suggestions. Some skilled teachers cannot analyze their own skill or that of others; hence they are poor supervisors of practice, just as many skilled athletes make poor athletic directors or coaches, as noted above on page 108. Thus we see that skilled supervision is a very difficult matter. A person may be a master of the theory of teaching but not be able to apply it in training teachers in practice; or he may be a master teacher and not be able to analyze skill in teaching; or, finally, a person may be both a master of theory and a skilled teacher, and yet not be able to direct practice teachers in such a way as to develop them. Perhaps the greatest art in teaching is skilled supervision of teachers.

Routinized scheme for administering practice is desirable. — The skilled supervisor, or critic teacher, should have frequent conferences with a practice teacher to discuss with him the latter's plans as related to the fundamental purposes of the teaching to be done and the principles that should govern it. He should endeavor to get the practice teacher to develop the habit of thoughtfully planning all teaching and of always trying to secure improved results. As a basis for mutual understanding and economy in such conferences it is desirable to have some formal scheme for writing out plans for teaching. This is wise even when there are only a few practice teachers. Mimeographed or printed descriptions of such a scheme provide at the outset for certain routine conditions that facilitate discussion and save giving many oral directions which may be incomplete or which it may be necessary to repeat. When there are many practice teachers and supervisors, some such routine device is absolutely necessary for economy and greatly increases efficiency.

Herbartian formal steps a favorite routine device. — Moreover, such a scheme assists new supervisors or critic teachers in working into the system. In any case, supervision is a difficult process; beginners often have trouble in getting the ideas and technique of doing it, and are greatly assisted by a routine scheme that contains many of the essentials of good planning and good teaching. This is one of the reasons for the popularity of the Herbartian five formal steps of instruction. These are essentially a routine device to assist beginning practice teachers and supervisors in the planning and administration of practice teaching. As ordinarily administered they make routine provision for some of the most important principles of method, especially as applied to reflective thinking. They may be described as follows:

1. *Preparation.* — Stating the aim of the lesson, recalling related facts, and taking other precautions to put pupils in the right frame of mind for the new material.

2. *Presentation.* — Securing new data or experiences from reading, lecturing, conversing, experimenting, questioning, etc.

3. *Association, comparison, and abstraction.* — Discussing and interpreting the new material, relating it to previous experiences, comparing, classifying, arranging, noting common characteristics, perhaps reaching a vague feeling of the general principles involved.

4. *Generalization.* — Formulating a statement of the general principles which have been worked up to in step 3.

5. *Application.* — Interpreting other situations or experiences (new or old) in terms of the generalization reached, working particular problems, and judging special cases of all sorts.

It is evident that the first step provides for the application of the principle of apperception, one of the most important factors in successful teaching (see above, pp. 300–312). The second step provides for the study of specific examples as the basis of the study of abstractions and generalizations. This point we have also emphasized (see p. 217). The fifth step provides specifically for practice in using the knowledge acquired — a further characteristic of good teaching (see pp. 208 and 226).

Herbartian scheme has improved practice teaching. — Thus we see that the formal steps have served a very useful purpose in improving practice teaching in American normal schools by furnishing a routine device that insures the observance of some of the most important principles of method. As stated in the note on page 229, the steps do not correspond to the processes of reflective thought, as is sometimes claimed; but it is not essential that they should. They may be used as a practical device in many lessons with fairly full assurance that better results will be obtained than if no such definite basis of planning had been used. To be sure, if some better scheme can be devised, it should be adopted.

A routinized scheme for planning lessons, which is based somewhat on the Herbartian formal steps (although these are not distinguished in the lesson plans), is described in McMurry's "Method of the Recitation" (1903) (pp. 329–339). The general principles to be applied in planning are so admirably set forth that McMurry's chapter has been very influential in determining the administration of lesson-planning in normal schools throughout the United States.

Separate subject matter and method. *Brief of former.* — The most important point in McMurry's general discussion concerns the separate study, mastery, and arrangement of *subject matter* and *method* in the writing of plans. This point applies especially to the teaching of lessons in history, English (both literature and composition), science, and some lessons in mathematics and foreign language. After the practice teacher has been given the assignment of topics to be taught (say the Peloponnesian War in Greek History, or old English ballads in literature, or the qualities of chlorine in chemistry) the first point that both supervisor and practice teacher should make sure of is that the latter has a thorough mastery of the subject matter to be taught. This means not only a thorough knowledge of the detailed facts, but also clear ideas of the relations involved and of the relative values of points. The writing of a brief of the subject matter furnishes the best device for the practice teacher to use in organizing his own ideas. Moreover, the practice teacher's brief also furnishes the supervisor with a definite objective basis for checking up the former's ideas with him (compare pp. 280 and 432).

Practice teacher needs full knowledge. — Practice teachers need to be strongly impressed with the necessity of deep and thorough knowledge of the topics they are to teach. They should realize that profound knowledge is needed by the teacher in order to give pupils a correct and impressive introduction. In many cases, in order that the pupils may get a correct general idea, many details and examples must be given which they will not be expected to remember. But the teacher must have all of these details thoroughly mastered and learned ; hence he must know and give much more than the students will learn (compare Chapter IV, pp. 76–78).

A practice teacher who is preparing and organizing a topic for teaching might revise his brief of the subject matter a number of times. At first his organization may be determined entirely by the character of the material itself, but he may modify the arrangement later from the standpoint of the order in which the topics might be taken up to best advantage in the series of lessons.

Write out pivotal questions in method plan. — After the inexperienced practice teacher has mastered and organized his subject matter for teaching, he should plan and write out quite completely an account of the anticipated procedure in the teaching. This plan should contain the exact wording of the more important questions that he expects to ask. The difficulty of wording questions well has already been emphasized (see pp. 467–468). It is much easier to tell a known fact than to secure a statement of it from others by questioning. Hence the practice teacher who has mastered his subject matter has only begun to get ready to teach it. He might go before his class prepared to lecture glibly for half an hour, and yet be completely at a loss in trying to secure effective and economical progress by questioning. It behooves him to do everything he can before undertaking the actual teaching, to overcome the difficulties that will confront him. If his class is well behaved, his greatest difficulty will be to keep thinking with sufficient clearness and rapidity to ask good questions. If his lesson follows certain well-organized general lines, he can depend upon using as the most important questions those which he has carefully prepared in advance. These principal questions constitute the turning points in the discussion — the points upon which many of the minor questions may hinge. McMurry calls them *pivotal* questions.

A mimeographed scheme of directions should be provided. — The mastery of subject matter and its organization in the form of a brief, to be followed by a detailed working out of the anticipated procedure in the teaching, including the exact formulation of pivotal questions — these are the two chief points in the planning of many lessons. This is especially true of lessons that involve association of ideas, reflective thinking, enjoyment, or linguistic expression. In addition to these two main points there are many details to be considered in the administration of lesson-planning, and these should all be provided for in some routine scheme. As a basis for organizing these details in a complicated situation the author uses in the School of Education in The University of Chicago the general scheme of directions printed below. The directions apply to practice teaching from the primary grades through high school. Any skilled, competent supervisor in the school may make modifications in the plan to suit his own needs, *provided he furnishes a definite mimeographed substitute.* Many teachers who object to a scheme that they are asked to follow do so merely because they are irresponsible individualists who do not want to take the trouble to provide careful administration. Such teachers need to be held strictly to plans for efficiency that have been made by someone else. Other teachers, however, may devise modified schemes that fit their peculiar needs better than the general scheme does. They should often be encouraged to do so. Thus, the head of the mathematics department in the University of Chicago High School, who has charge of the practice teaching in mathematics, uses mimeographed modifications of the general directions, which are especially adapted to such practice teaching as he supervises. The general directions which are printed in a handbook for practice teaching prepared by the author are the following:

DIRECTIONS FOR LESSON PLANS

Lesson plans should be prepared according to the directions given below for that purpose. At first the plans required should be very complete, but as the student progresses the plans may be briefer at the discretion of the critic teacher. These plans should show the critic's signature and date when approved.

In the case of lessons in geography, history, science, literature, and other content subjects above the second grade, and in general where there is a considerable body of subject matter to be taught, the following directions should be adhered to. In the work of the first and second grades, and in the constructive work in all grades where the subject matter is meager, the separation of subject matter and method need not be made. In mathematics and reading the practice will vary, depending upon the topic and the method.

In case there is no reading to be done by teacher or pupils, 2, *d* and 2, *e* should be omitted.

1. Separate subject matter and method in the plan, putting the former on the left-hand page and the latter on the right-hand page (or in the left-hand and right-hand columns, respectively, of the same page). Use theme paper.

The subject-matter plan for any topic should be completed in advance; the method plan may be prepared from day to day or for longer periods, as the critic teacher directs.

2. Under subject matter state:

a. Topic of the lesson or lessons.

b. Grade in which the teaching is to be done.

c. Teacher's aim briefly in terms of information, or skill, or habits, or ideals, or interests, or emotions of specific kinds.

d. Page references to sources of teacher's information.

e. Page references to reading to be done by pupils. Also list of illustrative materials to be used.

f. A brief analysis of the main points in the lesson (from two to four brief statements).

g. An outline (in the form of a rather complete brief) containing all important facts, principles, information, relations, experiments which are to be contained in the lesson. The *outline is to consist of complete, concise statements*, not merely topics. It should be so paragraphed and subdivided as to indicate clearly the subordination and relative value of the parts.

3. Under method give:

a. A short description of the general procedure to be followed in the teaching (in from two to four brief statements).

b. A detailed statement of the anticipated procedure, showing chief steps to be followed in teaching the lesson and *main* questions to be asked. This should consist of concise statements and *complete questions* paragraphed and subdivided in the form of a brief. Indicate at appropriate places how illustrative material and various forms of expression are to be used.

4. Note the difference between 2, *g*, outline of subject matter, and 3, *b*, outline of method. 2, *g* calls for the bare facts; 3, *b* calls for the method of treating these facts in the class. For example, in a plan for teaching Shakespeare's "Julius Cæsar" a student began 2, *g* as follows:

"I. Time and historical setting.

1. 44 B.C. Based with remarkable faithfulness on Plutarch's narrative.
2. The old Roman democracy was hopelessly broken down.
3. Cæsar the man of the hour. Made himself master of the army and defeated his great rival, Pompey, in battle.
4. Created dictator for life.
5. Observed lenient policy toward enemies but many not grateful."

Under 3, *b* the same topic appeared as follows:

"I. Time and historical setting.

1. Give the date of the action of the drama.
2. Describe the political situation at Rome.
3. In the battle from which Cæsar had just returned, who were the contestants and what were the results?
4. What was Cæsar's position in the state?
5. What faction was forming against Cæsar?"

A few comments on certain points in the above scheme may be necessary. As indicated in the second sentence of the directions, the plans may be shortened as the practice teacher acquires skill. A short written plan, at least, should always be required, however, even of a fairly skilled practice teacher, since even the most experienced teacher will make a plan of a topic which he is going to teach for the first time. This plan would include a short brief of the subject matter, and the pivotal questions.

Paragraph 2, *c*, concerning the teacher's aim, usually needs some elaboration to make its meaning clear. The analysis suggested here corresponds to the discussion of proximate aims given in Chapter II (pp. 18–23).

Paragraphs 2, *d* and 2, *e* are intended to make sure that the practice teachers cover a wide range of reading in the content subjects as a basis for a thorough knowledge of the topics to be taught. This reading should be done in standard authorities, not simply in textbooks. The supervisor should make it easy for the practice teacher to obtain such material to read.

Sample-lesson plans. — Practice teachers may secure a number of suggestions from sample-lesson plans. For this purpose they should read all of the references given in the bibliography at the end of this chapter.

Make plans of lessons observed. — As an exercise in securing ideas concerning the organization of lesson plans, a practice teacher may observe a series of lessons taught by a skilled teacher, take notes on these, and write them up under the headings required in the scheme for plans. This should prove particularly helpful in getting ideas concerning specific purposes which the teacher seems to stress, and concerning the organization of subject matter and the wording of pivotal questions. In seeing the same skilled teacher give the same lesson to different classes, often with a year intervening, I have been impressed with the definiteness of the plan and the extent to which it tends to follow the same general lines in the various classes. After much study and experimentation a series of progressive steps and pivotal questions have been selected by the teacher, which, with slight variations, secure specific valuable responses and results with almost perfect certainty. If the practice teacher who is observing such teaching will cast the description and content of it in the form of a lesson plan, it will often appear as an excellent model.

Departure from plan while teaching. *Not necessarily wide with experienced teachers.* — It is sometimes urged that a teacher cannot foresee just what direction a lesson will take, and hence that the making of a definite plan is a waste of time. Such facts as those given in the previous paragraph show that the necessary range of variation in skilled teaching of a given topic is not as wide as is implied in this contention. There is variation, but it is within limits that can be anticipated by the skilled teacher who has mastered the subject matter thoroughly and who sees clearly the fundamental purposes and relative values involved in the series of lessons. Hence, while the actual carrying out of a plan will be adapted to circumstances, a teacher will usually not depart from the fundamental lines that he has planned. There are some supervisors who criticize practice teachers for failure to follow up every chance interest which is expressed during a recitation. Such criticisms are based on a wrong conception of the purposes of instruction. Skilled teaching consists in stimulating and directing mental activity so as to accomplish certain *specific* aims and results; it does not consist simply in arousing *any* mental activity that may be secured by taking advantage of any *chance* interest. Even if the interest which is expressed presents valuable possibilities, it is not necessary to follow it at the time; a tactful expression of appreciation on the part of the teacher and postponement until some other time are sufficient.

But more serious consideration needs to be given to unforeseen *difficulties* encountered in the teaching of a lesson or series of lessons. These seldom occur with the teacher who has taught the same topics to similar classes a number of times. They will be quite frequent, however, with practice teachers. The plan should be readjusted so as to provide for them, but not so as to lose sight of the purpose of the lessons.

Example of routine directions to practice teachers and supervisors. — Some additional suggestions concerning the organization of practice teaching may be secured from the following extracts from the author's "Handbook for Practice Teaching," which is used as the basis of administration of this work in The University of Chicago.

THE CONDUCT OF PRACTICE TEACHING

1. **General purpose and character.** — The purposes of this work are (*a*) to help students to appreciate educational theory by themselves putting it into practice, and (*b*) to train them in those practical adjustments which constitute effective teaching. Generally speaking, the sooner a student teacher can be prepared to do some effective teaching, the better. Observation which follows some attempt at teaching is more valuable than that which precedes teaching.

2. **Duties of student teachers.** — *a*. The student is responsible for understanding and appreciating the work of the term in the subject assigned for practice, and any other phases of the curriculum of the school or the work of the grade that the critic teacher desires to take up.

b. The student is responsible from the beginning for participating and assisting in the activities of the room — for example, correcting papers, gathering materials, assisting individual pupils, etc.

c. As a rule the student will be assigned at first some easy subtopic in a larger unit and allowed to teach from one to five lessons, thus being initiated gradually into the work.

d. The number of periods of teaching will be increased as the student becomes capable of assuming them.

e. Student teachers are expected to attend critic meetings which are arranged by critic teachers. These will be frequent during the first part of the quarter.

f. Student teachers should get ready to begin teaching as soon as possible, and are held strictly accountable for expected results.

g. The student is primarily responsible to the critic teacher in whose place he teaches. He may be referred to the appropriate department in the College of Education for assistance in securing the material needed in preparation for his teaching.

3. **Reports by critic teachers.** — Reports from the critic teacher are filed with the dean. These reports will be made the basis not only for credits in the course but also for later recommendations to positions.

The points outlined below are considered in making these reports, which characterize very definitely and in detail the individuality of the student teacher. This does not mean that the critic teacher reports on each point in every case, but that he emphasizes those points that are especially significant for the particular student teacher concerned. The critic also adds comments on any other notable aspects of the student's work.

a. Preparation of lessons. — Clearness of purpose; originality; thoroughness; organization of subject matter; appreciation of relative values; mechanics of plan-arrangement; paragraphing, conciseness of statement, writing, etc.

b. Skill in conducting recitations. — In exposition, or telling; questioning; holding attention and interest; reaching individuals; using children's experiences and responses; keeping lessons organized; economizing time; securing and fixing definite results; using blackboard and other means of illustration; care of pupils' English; assigning study lessons, etc.

c. Ability to manage children. — General attitude — formal, informal, severe, sympathetic; systematizing and economizing routine; handling distracting or disturbing elements; maintaining authority; decision; consistency, etc.

d. Personal fitness for teaching. — Health; energy; sense of responsibility; intelligence; knowledge; willingness; attitude toward criticism; promptness; persistence; animation; general culture — refinement; courtesy; confidence, poise; neatness; carriage; voice, enunciation, etc.

e. General rating of teaching (as excellent, good, fair, barely passable, unsatisfactory).

Conclusion of discussion of practice teaching and lesson planning. — This will conclude our discussion of practice teaching and lesson planning. It is probable that during the next decade prospective high-school teachers will be provided with means for such activity. In order that large profit may be secured from a small amount of practice, it is important that schemes for practice teaching be carefully routinized and that the general principles of practice be applied. These include a correct distribution of time and very careful planning of lessons in order to secure a correct start. The careful organization of subject matter in the form of a brief, and the preparation of pivotal questions, are among the most important elements in correct planning.

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4. University of Wisconsin. *Bulletin of the University of Wisconsin High School* (1914). A unique scheme of mixed observation and practice teaching has been organized in this institution. Student teachers participate in all the work of a high-school class and may be called on at any moment to "do the next thing" either in the form of reciting or of teaching.

5. Society of College Teachers of Education. Report on the Professional Preparation of High School Teachers. Published as the *Eighteenth Yearbook of the National Society for the Study of Education*, Part I. (Public School Publishing Co., Bloomington, Ill., 1919.) Contains many excellent accounts of actual operations, including practice teaching.

EXERCISES

For problems for class discussion of Chapter XXI, see *Exercises for "Methods of Teaching in High Schools,"* pp. E 243–E 244.

CHAPTER XXII

MEASURING THE RESULTS OF TEACHING

Main points of the chapter. — 1. Careful testing of the results of teaching is necessary in order to determine to what extent its aims and purposes are being achieved.

2. In order to avoid the extremes of overemphasis and neglect of testing, routine provision for frequent short written tests should be made, but only a small part of the recitation periods should be used for this purpose.

3. The tests should be so conducted as to show the real relative abilities of the students.

4. The possibility of securing satisfactory testing varies with the different types of learning; it is easy to test the acquisition of information, but almost impossible at present to measure the development of habits of enjoyment.

5. Tables of distribution of the grades made by all the students in the class should be shown and each student informed of his own standing with reference to the rest of the group. Comparisons between individuals should be avoided, however.

6. In order to measure the relative achievements of different classes and schools, and the relative efficiency of different methods of instruction, more reliable units and scales for rating achievement in the various subjects are necessary.

7. Such scales are being rapidly developed in several subjects, and permit of more impartial, objective, precise, and verifiable investigations of the results of teaching than prevailed until recently.

Measurements of results show whether purposes have been achieved. — In connection with all the processes of learning and instruction that have been discussed in preceding chapters it is important to measure frequently the results that are being achieved, in order to determine to what extent the aims and purposes are actually being realized. Such measurements may consist of the ordinary oral or written tests given by the teacher, or of elaborate measurements, by expert supervisors, of the achievements of many classes or schools or systems. These tests or measurements are of value to the students, the teacher, and the supervisors. To the students the ordinary tests serve as a stimulus to study, and, if properly administered, keep each student informed of the progress which he is making. This information concerning the progress of the students enables the teacher to adapt his instruction to their needs and to judge of the success of his own efforts and devices. The comparative measurement of the results achieved by many classes and systems enables administrative officers and expert educational investigators to determine just what the schools actually are accomplishing, and the relative efficiency of various methods of instruction in securing desirable results. We shall take up first the discussion of ordinary quizzing, testing, and examining by the individual teacher, and then consider the larger comparative measurements of the achievements of several classes and of the efficiency of different methods of instruction.

Routine testing by the teacher. *Avoid extremes of overemphasis and neglect.* — In connection with the ordinary quizzing, testing, and examining by the individual teacher we find two extreme practices, with all intermediate degrees of variation. The extremes are those of *overemphasis* and absolute *neglect*. The extreme of overemphasis of quizzing and testing is found in the common practice of using the recitation period largely for the asking of questions to determine whether students have studied their lessons. Often the whole period is given up to oral quizzing or testing. The extreme of neglect is found in the work of those idealistic instructors who insist that testing and examining are debasing, pernicious educational practices. They maintain that the teacher should assume that students are zealous and conscientious and that they have studied faithfully. Consequently they say that the recitation should be used entirely for supplementary and inspirational discussions.

Both of these extremes should be avoided. The use of the entire recitation period for oral quizzing to determine whether lessons have been studied wastes the time of those who have mastered the assignments, fails to utilize the opportunity for supplementary and interpretative discussion, and removes the best motive for recitations ; namely, a real audience situation. On the other hand, the neglect of testing altogether is based on the false assumption that most students will study conscientiously without some regular stimulus other than the mere love of study. Even for most adult workers the spur that results from the necessity of showing certain definite, tangible results at no remote date is an important factor in achievement. A good example of this is found in the way teachers themselves will delay the writing of a paper or address that is not due for some time, and will really not get down to work until the occasion is imminent and they must show the results. Moreover, unless teacher and students are continually taking stock of the progress that has been made, of what has been mastered and what has not, their efforts to secure a systematic, thorough mastery of the subject may often be wasted to a considerable degree and result in merely a superficial, confused impression of the subject.

Frequent short tests obviate both overemphasis and neglect. — Both extremes (namely, the overemphasis of testing and its neglect) may be avoided by setting apart a small but definite part of the recitation period, or of a series of periods, for testing, and using the rest of the period or periods for supplementary and interpretative discussions. This practice is simply an application of the general principle of making routine provision for activities which it is desirable to make sure of securing periodically. It is similar in general arrangement to the setting apart of periods for supervised study, as discussed above on page 402. Such routinizing is absolutely necessary for relatively unskilled, inexperienced teachers if they are to avoid neglecting important processes, and it is valuable from the standpoint of mental economy for even skilled teachers. If this general practice of routinizing the program is followed, specific and sure provision will be made for careful assignments, supervised study, testing, and supplementary and interpretative discussions, none of which should be neglected.

Written tests better than oral tests. — Probably frequent short written tests, supplemented by occasional long written examinations, constitute the best form of routine testing. Students and teachers usually favor short written tests instead of oral quizzes, if we may assume that the same general practices should prevail in this regard in high schools as in college. The general sentiment of college students themselves concerning the value of written quizzes was secured in an investigation of certain problems of instruction in The University of Chicago.

> Of the Alumni 157 found frequent written tests in class especially valuable; 52 did not. Of undergraduates 102 found them so; 40 did not. . . .
>
> The question, Which is preferable, the oral quiz or the written test? was proposed to undergraduates. The opinion is nearly unanimous: 28 favor the oral quiz; 113 the written test; 9 a combination of the two. . . . The reasons given for the answers are significant and suggest at once to the teacher the respective purpose which each may well serve.
>
> The reasons assigned for preferring the oral quiz are: "requires quick thought," 2; "errors can be corrected and explanation given," 13; "gives training in speaking," 2; "makes the student more logical in speaking," 3; "prevents misunderstanding of questions by student or of answers by teachers," 3.
>
> The reasons assigned for preferring the written test are: "gives time to think and organize and present more logically," 57; "student is more at ease," 17; "less chance for bluffing," 7; "gives all

equal chance on same questions," 11; "gives a chance at more than one question," 18; "is fairer," 22; "is more thorough," 14; "calls for more preparation," 6. (**9**: 64–65)

Precautions for assuring commensurable results from students. — In order to assist in the interpretation of the results of written tests it is desirable to take certain precautions in administering them. In the first place, unless every student is given just as much time as he wishes in which to answer all of the questions, the *same* amount of time should be given to all students and the examination made so difficult that no student can get all of the answers completed in the time allowed or can make a perfect score. If this is not done, certain students may finish all of the answers before the allotted time is up, and the teacher cannot tell how much better they might have done if they had been given an opportunity. Also, there is likely to result an undistributed group of perfect scores made by students who really have not the same degree of mastery of the subject. In other words, if the examination is not made sufficiently difficult, out of a class of twenty-five students seven or eight may make a score of A (95 per cent to 100 per cent) and appear to have very nearly the same mastery of the subject; whereas, if they were given questions that would really test them out, it would be found that some members of the group of eight who made a grade of A could really do much better than the others who made the same grade. For the same reason all students should usually be required to write on all questions if the examination covers the same assignment for all. Moreover, the students should probably be required to answer the questions in the order in which they are given, and if a student omits a question but answers those that follow, it should be assumed that he is not prepared upon the one that was omitted. In cases where the questions permit of long discussions, it is often well to place a limit on the time taken to answer each question; for example, in tests or examinations in education I find that the best basis for securing commensurable results from students consists in giving a number of questions covering the assignments and in placing such a limit upon the time for each question that the best-prepared students can barely finish it in the time given. After the class is started, I announce, "Time to begin the second question," "Time to begin the third question," etc. This not only secures fairly reliable, comparative measures of what the students can do, but saves them from bothering about the distribution of their own time and helps them to concentrate their minds upon the questions and upon organizing and writing their answers. In subjects like mathematics, where each answer can be definitely completed, the time limit on single problems would not apply, but commensurable results would be secured by the other practice, referred to above, of giving such a long list that no one could get them all done in the allotted time. Occasionally the teacher needs to make allowance for the variation in the speed of handwriting of different students, but this is seldom practicable.

Require preliminary written outline of answer to each question. — In order to assist students to develop skill in answering questions which require discussion, as well as to secure answers that the teacher can read and evaluate rapidly, the latter should advise the students to organize mentally the answer to a question in the form of an outline before beginning to write out the complete answer. This outline might appear in the student's paper as a part of the answer. When such a device is used, the training in the rapid organization and expression of thought which written tests and examinations provide is further justification for giving them frequently.

Measuring various types of learning. *Remembering, understanding, and applying.* — In the intellectual studies, examinations may test any or all of the three following phases of the student's study and progress: (1) what he remembers, (2) how well he understands what he remembers, and (3) how well he can use or apply it.

(1) It is easiest to test what students remember; consequently there is danger of overemphasizing this factor in testing, and neglecting the other two. It should be very definitely included in the testing, however, for reasons that are given at length on pages 19 and 420. (2) Testing how well students *understand* what they remember is much more difficult than simply ascertaining what they remember. Questions for the former purpose usually call for explanation, interpretation, or supplementing by the students. (3) To test how well students can really use what they have learned, in solving problems or explaining new situations, is not difficult in mathematics, grammar, and the natural sciences, but it is difficult in such subjects as history, where there is much information to be acquired but little opportunity to apply it. The most difficult type of examination question to devise in some subjects is one that tests all three of these phases of the student's preparation and progress at the same time. That is, we want to find out whether the students have studied certain specific assignments and whether they understand what they have learned and can apply it. In mathematics and the natural sciences this can be done without difficulty in many cases by setting problems that require ability to recall, understand, and apply certain formulæ which occur in the assignments for study. In the social sciences (history, sociology, civics, economics, education, ethics, etc.), however, this is often difficult, because students may sometimes discuss an applied problem very ably on the basis of general information, without having studied the assigned readings at all. Such bluffing by students on explanatory and applied questions often makes it necessary for the instructor in such subjects to ask purely informational questions which cannot be answered by the students unless they have studied the assigned readings.

General impression of objective products in motor learning. — In the testing of results in subjects involving motor skill there are usually definite objective tasks which can be assigned and the results graded roughly according to quality and speed or time required. As a rule the teacher's general impression of the achievements of various students is the basis of the grading. The general impressions of some teachers are fairly reliable, but they should be verified by more precise means of testing and measuring than we now possess.

Difficult to measure fundamental aspects of expression. — The testing of skill in expression (for example, in composition in high school) is very difficult, owing to the complexity of the factors involved and the lack of definite standards for some of the more intangible qualities, such as clearness, organization, impressiveness, etc. As a consequence unskilled teachers give attention to certain rather definite objective factors, such as spelling, punctuation, and indentation, and grade almost entirely on this basis, thus largely disregarding the other more fundamental aspects of skill in expression.

No adequate measures of habits of enjoyment. — For testing the acquisition of habits of enjoyment we have almost no methods. How can a teacher find out what relative progress the various members of a class in music have made in the development of habits of enjoying standard music? How can a teacher of literature ascertain the same fact for the better grades of fiction or contemporary periodical literature? Owing to the difficulty of setting examinations for such factors, and to the ease of testing information acquired, nearly all teachers of such subjects simply make up questions that test the student's knowledge of facts or allusions, or of the technical qualities of compositions or selections, and entirely fail to test habits of enjoyment. Such a practice is not only a failure from the standpoint of effective testing, but it is also pernicious because it tends to throw the emphasis upon purely intellectual instead of emotional processes in the instruction.

Methods of grading. *May be based on relative position in some subjects.* — The returns secured in tests and examinations should be carefully graded, the marks distributed so as to show the relative number of achievements of different grade, and each student informed just where he stands in the distribution; that is, with reference to the achievements of the class as a group. In certain subjects, like algebra and the grammatical exercises in a foreign language, it is relatively easy to get definite grades for papers in terms of per cents, which will represent fairly well the relative achievements of the students. In the case of examination papers in which discussion is the most important thing, however, it is difficult to rate or grade exactly. Hence it is a good practice to distribute such papers into piles according to their relative value, and then to assign a grade to each pile. The teacher may estimate roughly that five grades or piles will do. Upon reading the first paper he places it where it would seem to belong; that is, as being of first, second, third, fourth, or fifth grade. Similarly with the following papers. If a paper is read which seems to be superior to any which have been placed in the first-grade pile, it can be placed in a new pile by itself, thus establishing a new best grade. Similarly, grades or piles between the others or below the others can be started if it is found necessary. Usually from five to ten piles will be sufficient. After this distribution by relative position has been made, the teacher can decide what grade in the regular marking system is deserved by the best paper or papers; that is, whether it should be marked A or A–, or B. Similarly, the mark for the poorest paper or papers could be decided upon, and then the intermediate piles assigned their marks accordingly. If there are many papers, and the examination has been sufficiently difficult, it will be found that the distribution will roughly approximate the normal type described above on page 377.

Correct all answers to each question by itself. — In cases where there are a great many papers to grade, and the answers take the form of discussions, it is often well to read the answers to the first question in all the papers and rate them before reading the answers to the other questions. In doing this the same method of distribution by relative position should be followed as described in the preceding paragraph. That is, while simply reading answers to the first question the papers should be distributed into five piles. After reading all first answers, the papers in the best pile should all be given a grade of 5 on the first question, and those in the poorest pile a grade of 1 or less. The papers in the other piles should be labeled 4, 3, and 2 for the first answer, according to the piles in which they belong. Grades $1\frac{1}{2}$, $2\frac{1}{2}$, $3\frac{1}{2}$, and $4\frac{1}{2}$ can be inserted if desired. The papers are then shuffled and all of the answers to the second question are read and numbered in the same way. After this has been done for all the questions, the scores for the several answers in each paper can be added to secure a single score. The paper having the highest total score will be the best paper, and the one having the lowest will be the poorest. It can then be determined what grades in the regular marking system these extremes deserve, and the marks for the intermediate papers can be assigned accordingly.

Inform class of the general distribution of grades and let each pupil know his own grade. — After grading the papers they should be returned to the students in such a way as to minimize the giving of publicity to individual achievement. On the other hand, the group achievement should be shown and explained to the class just as fully as possible by putting on the blackboard a table of distribution showing the number of A's, B's, C's, etc. made in the examination. This will enable each individual to understand just where he ranks with reference to the possible achievement in that class and subject, without introducing any comparisons between individual students. At the same time the teacher should discuss the various types of possible answers to the several questions, and should comment on good answers and typical errors.

The periodical testing of the achievements and progress of students could be greatly improved by the development of adequate scales of measurement and standards of achievement and the mastery of the special technique of using these. The discussion of these can be taken up to best advantage, however, in connection with the second large aspect of measuring the results of teaching; namely, the testing of the relative achievements of different groups of students, or of different schools or different systems, to which we shall now turn our attention.

Comparative measures of different classes and methods. *Enthusiastic interest developed recently.* — The development of an interest in securing adequate reliable measures of what schools are actually accomplishing has occurred during the last twenty years. This fact is brought out in the following statement by Ayers, written in 1912.

> Fifteen years ago the school superintendents of America, assembled in convention in Indianapolis, discussed the problems then foremost in educational thought and action. At that meeting a distinguished educator — the pioneer and pathfinder among the scientific students of education in America — presented the results of his investigations of spelling in the school systems of nineteen cities. These results showed that, taken all in all, the children who had spent forty minutes a day for eight years in studying spelling did not spell any better than the children in the schools of other cities where they devoted only ten minutes per day to the study.
>
> The presentation of these data threw that assemblage into consternation, dismay, and indignant protest. But the resulting storm of vigorously voiced opposition was directed, not against the methods and results of the investigation, but against the investigator who had pretended to measure the results of teaching spelling by testing the ability of the children to spell.
>
> In terms of scathing denunciation the educators there present, and the pedagogical experts, who reported the deliberations of the meeting in the educational press, characterized as silly, dangerous, and from every viewpoint reprehensible the attempt to test the efficiency of the teacher by finding out what the pupils could do.

With striking unanimity they voiced the conviction that any attempt to evaluate the teaching of spelling in terms of the ability of the pupils to spell was essentially impossible and based on a profound misconception of the function of education.

Last week [February, 1912], in the City of St. Louis, that same association of school superintendents, again assembled in convention, devoted forty-eight addresses and discussions to tests and measurements of educational efficiency. The basal proposition underlying this entire mass of discussion was that the effectiveness of the school, the methods, and the teachers must be measured in terms of the results secured. . . .

The object of the new method is the substitution of evidence for opinion and knowledge for speculation. Its champions are working to develop measurements in education because they realize that only by this method can education become an art and a science and its practice be changed from a vocation to a profession. They scan the history of science and remember that through the development of measurements astronomy grew out of astrology, chemistry emerged from alchemy, and physics developed from mystery.

They read the history of education and realize that the astonishing progress of the past decade has come from shifting the position of inquiry from asking " What results *can* or *might* we get " to " What results *are* we getting ? " This makes the pupil and not the teacher the center of interest. It calls a halt on the futile quest for standards of attainment on which we have never come to an agreement, and aims instead to discover units of measurement. Simple as it sounds, this change from asking " What results *should* we get ? " to asking " What results *are* we getting ? " is the keynote of the whole scientific method in education. To answer the question in its new form means the development of units of measurement, and when these are secured, the standards of attainment will work themselves out automatically. (**1** : 300, 308)

Ordinary opinions are unreliable for comparisons. — The need of determining the value of teaching by a measurement of its results, instead of relying upon the observation and opinion of teachers and educators, is shown by the great difference of opinion among such persons when judging the same teaching.

Thus, one supervisor will say that a geometry lesson was very well taught because the students were active and alert and there was much rapid-fire discussion. Another supervisor will condemn the same lesson because the students were not quiet and self-controlled. Needless to say, the only adequate basis of judging the effectiveness of the teaching is found in the measured achievements and progress of the students in acquiring and mastering geometrical processes, methods, ideals, and interests.

Judgments of science made reliable by special technique. — The judgments of opinion have been contrasted with the more reliable judgments of science by Ayers in the above quotation and by Thorndike in the following statement:

> The judgments of science are distinguished from the judgments of opinion by being more impartial, more objective, more precise, more subject to verification by any competent observer, and by being made by those who by nature and training should be better judges.
>
> Science knows or should know no favorites and cares for nothing in its conclusions but their truth. Opinion is often misled by the "unconscious logic of its hopes and fears," by prepossessions for or against this or that book or method or result. Science pays no heed to anything but the facts which it has already made sure of; it puts nothing in the scales but objective evidence. Opinion trusts its personal impressions, bows to authority, and follows the crowd. Anyone's opinion constantly favors the methods he is used to, and is suspicious of new ideas except his own; it accepts without verification and rejects without a fair trial. Science seeks precise quantitative measures of facts by which changes and correspondences may be properly weighed; opinion is content to guess at amounts of difference and likeness, to talk in the vague terms of more or less, much and little, to rate a method as better or worse without taking the pains to find out just how much better or worse it is. Science reveals the sources of its evidence and the course of its arguments, so that any properly equipped thinker can verify for himself the facts asserted to be true. Opinion offers itself to be accepted or rejected, but not to be verified or intelligently criticized. Science is the work of minds specialized to search after truth and selected as fit for the work by their equals and superiors in it.

Opinion is the occasional thought of those who, though important and capable people, are yet only amateurs in the work of getting truth.

Science would decide between two methods, say of teaching reading, by giving each an adequate trial, by measuring exactly the changes in bodily welfare, knowledge, interest, habits, powers, and ideals caused by the two, and by comparing impartially the results in the two cases. It would, for instance, arrange that method A should be tried in ten or twenty classes and method B in ten or twenty other classes of equal ability and advantages, taught by equally competent teachers. It would make sure that the two groups of teachers tried equally hard and that the two groups of classes were alike with respect to schoolroom equipment, the amount of time given to reading, and the like. It would measure with precision the accomplishment of each pupil in reading itself, in spelling and writing, in knowledge of facts gained, in appreciation of good literature, in interest in reading, in such habits as might be influenced by the special training of reading, in power to learn new things, and so on through the list of all the changes which instruction in reading may produce. (**4**: 265–267)

Variations in opinions shown by grading of a geometry paper. — One of the chief difficulties in the way of securing such reliable scientific judgments and measurements as Thorndike describes is the lack of units and scales of measurement to use in rating or grading the achievements of students. Even the grading or measuring of such a definite piece of work as a student's geometry paper is quite difficult, and under ordinary circumstances permits of the widest variation, owing to the varying opinions and standards of different teachers. This fact was brought out strikingly by Elliott and Starch, who sent copies of the same geometry examination paper to a number of teachers to be graded, as described below.

The paper was written as a final examination by a pupil in one of the largest high schools in Wisconsin. Plates of this answer paper were made and several hundred copies were printed upon foolscap, thus exactly reproducing the original in every detail. . . .

A set of questions and a copy of the answer paper were sent to approximately 180 high schools in the North Central Association, with the request that the principal teacher in mathematics grade this paper according to the practices and standards of the school.

One hundred and forty papers were returned. Twelve had to be discarded because some of the data called for were not given.

Distribution of Grades Assigned to the Same Geometry Paper by 118 High-School Teachers

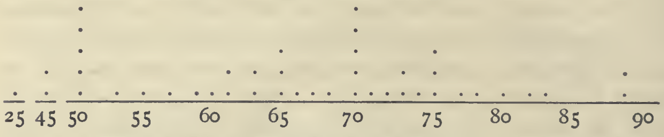

Fig. 1. Passing grade 70. 43 schools. Median 67. Probable error 8

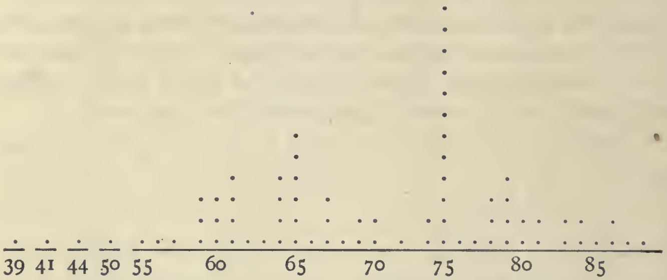

Fig. 2. Passing grade 75. 75 schools. Median 70. Probable error 7.2

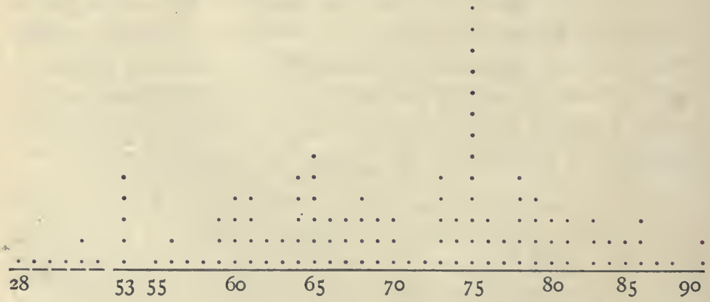

Fig 3. [Combined distribution.] Marks assigned by schools whose passing grade is 70 are weighted by 3 points. Median 70. Probable error 7.5.

> Of the remaining 128, 43 came from schools whose passing grade is 70, 75 from schools whose passing grade is 75, and 10 from schools whose passing grade is 80. The papers show evidence of having been marked with unusual care and attention. Separate grades and comments usually accompanied the answer to each question.
>
> The grades thus assigned are represented by the distribution charts in Figures 1, 2, and 3. The scheme of these charts is self-evident. The range of marks is indicated along the base line, and the number of times each grade was given is indicated by the number of dots above that grade. Thus, in Figure 1 the grade 70 was assigned by 5 teachers. . . .
>
> Figure 1 gives the values assigned by 43 teachers in schools whose passing grade is 70. Figure 2 gives the values assigned by 75 teachers in schools whose passing grade is 75. . . . Figure 3 is a composite chart showing the values assigned by [both groups] of teachers. (**8**: 255–257)

The wide variation in the distribution of the grades given to the same paper by different teachers shows the fallacy of the current assumption that a mathematics paper can be graded with mathematical precision or is so graded in ordinary practice. Thus, as shown in Fig. 1, in schools where the passing grade was 70, one teacher gave the paper a grade of 25, two others a grade of 45, and two others a grade of 90.

Elliott and Starch had tried a similar experiment with an examination paper written by a student in high-school English, and had found similarly a wide variation in the grades given it. Strange to say, however, the marks for the mathematics paper showed even greater variation. In commenting on this fact they write as follows:

> Why the marks of this particular paper vary even more widely than those of the English papers is to be sought in the fact that this geometry paper allowed of two fairly distinct ways of evaluation. The form, make-up, and appearance of the paper were of decidedly poor quality. Some teachers entirely disregarded these elements, while others imposed a heavy penalty upon the paper on

their account. In many instances this was indicated by the comments on the papers. But even this difference in viewpoint alone does not explain the extremely high or extremely low marks. For example, one teacher gave the paper a mark of 50 and said that he had deducted 4 points for spelling. Another marked it 45 and stated that he had made no deduction for the poor form. Still another one marked it 75 including a penalty for form or 85 excluding a penalty for form. Furthermore, the amount that was subtracted for careless make-up ranged from 3 points in the case of one teacher to 13 points in the case of another. (**8**: 258)

Scales of measurement are being developed in various subjects. — If reliable comparative measures of the achievements of various classes, schools, and systems are to be obtained, it is obvious that more reliable methods of rating these achievements must be secured than are provided by the ordinary systems of grading and marking. In order to secure more reliable objective scales and methods of measurement, a number of investigators have been at work for several years devising them for the various subjects. In the case of elementary-school subjects, C. W. Stone, working under the direction of Professor E. L. Thorndike, produced in 1908 standard tests for sixth-grade arithmetic. Work along this line has been carried still farther by S. A. Courtis, who has developed a series of tests and standards in arithmetic for all grades, which can be purchased and used to advantage by any school official. In 1910, Thorndike published a scale for the measurement of handwriting, and Ayers published another scale for the same subject about the same time. Thorndike also published a scale for drawing in 1913.

Example of scale for judging compositions. — In the case of high-school subjects the most interesting development is the "Scale for the Measurement of Quality in English Composition" worked out by M. B. Hillegas in coöperation with Thorndike. This scale consists of sample compositions of various degrees of merit, arranged in order and graded from

0 to 100. The following are examples of three grades in the series:

[Sample composition of grade] 0

Dear Sir: I write to say that it aint a square deal Schools is I say they is I went to a school. red and gree green and brown aint it hito bit I say he don't know his business not today nor yesterday and you know it and I want Jennie to get me out.

[Sample composition of grade] 37

SULLA AS A TYRANT

When Sulla came back from his conquest Marius had put himself consul so sulla with the army he had with him in his conquest seized the government from Marius and put himself in consul and had a list of his enemys printy and the men whoes names were on this list we beheaded.

[Sample composition of grade] 83

VENUS OF MELOS

In looking at this statue we think, not of wisdom, or power, or force, but just of beauty. She stands resting the weight of her body on one foot, and advancing the other (left) with knee bent. The posture causes the figure to sway slightly to one side, describing a fine curved line. The lower limbs are draped but the upper part of the body is uncovered. (The unfortunate loss of the statue's arms prevents a positive knowledge of its original attitude.) The eyes are partly closed, having something of a dreamy langour. The nose is perfectly cut, the mouth and chin are moulded in adorable curves. Yet to say that every feature is of faultless perfection is but cold praise. No analysis can convey the sense of her peerless beauty. (**3**: 214–218)

Such a scale makes it possible for a teacher or an investigator to rate or grade compositions in an objective way that anyone familiar with the scale can understand. For example, the teacher, after reading a student's composition, would say, "This is most like number 83 in the scale," and grade it 83.

Such a method of grading, when perfected, should produce much less variation in the ranking of papers by different judges than does the ordinary method investigated by Elliott and Starch. Moreover, it tends to include in the standard of grading the fundamental aspects of composition instead of merely including such minutiæ as spelling, punctuation, and indentation, as described on page 499. For improvements upon the Thorndike-Hillegas scale see number 5 in the bibliography at the end of this chapter.

Teachers should study technique of measurement. — The last five years (1909–1914) have witnessed enormous progress in the development, by experts, of such methods of measuring the results of teaching — methods that are impartial, objective, precise, and subject to verification by any competent observer. The beginning teacher may not be very much concerned with the use of these methods at first, but after he has developed control of the ordinary routine of teaching, he ought to train himself in the use of these methods, in order that he may secure reliable measures of the efficiency of his own teaching.

Conclusion of discussion of measuring results. — In this chapter we emphasized the necessity of developing a special and reliable technique of measuring the results of teaching. This technique should frequently be applied in the classroom by the teacher, in order to demonstrate to himself and to the students just what progress they are making. Each student should be told how his achievement compares with the total achievement of the class, but comparisons between individuals should be avoided. To be reliable and satisfactory, the measures of achievement should be impartial, objective, and precise as far as possible.

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EXERCISES

For problems for class discussion of Chapter XXII, see *Exercises for "Methods of Teaching in High Schools,"* pp. E245–E250.

CHAPTER XXIII

ORGANIZED OBSERVATION OF TEACHING

Main points of the chapter. — 1. In order that the practical applications of the principles of method may be made clear to students, it is desirable to organize systematic observations in connection with courses in method.

2. Such observations may serve either as illustrations of principles previously discussed or as the basis for deriving these principles.

3. An outline of questions is printed, which takes up most of the topics treated in preceding chapters and may be adapted to a variety of situations.

Observation essential to show applications of theory. — Perhaps the most instructive method of studying the general principles of method in normal-school or college classes is to take the whole class of prospective teachers to observe a lesson taught by a fairly skilled or competent teacher, and then to discuss the observed lesson from the standpoint of the general principles which have been studied or which are to be studied. In the case of prospective teachers such observations are almost essential in order that the principles which are under discussion may not remain purely abstract theory to them. Even in the case of experienced teachers it is often very illuminating to have it demonstrated that nearly all the questions of method that might be raised in connection with observed lessons do depend upon fundamental principles, and, furthermore, that having these principles in mind will enable them to analyze, interpret, and criticize teaching more skillfully. Unfortunately, much of our actual practice in teaching, even by skilled teachers, is done without conscious regard to sound fundamental principles; and, on the other hand, the detailed practical applications of fundamental principles are seldom indicated on a large scale by educational theorists.

Observations for illustration versus observations as sources of discussion. — For purposes of economy, in covering the ground in a general course in the principles of method it is usually necessary to have the observations serve primarily as *illustrations* of principles of method which have been or are being studied systematically in the class. It is possible, however, to *base* a course on observations so that practically all the principles which it is desired to formulate can be derived from previous observations through discussions strictly guided by the instructor. In my own teaching of *prospective* teachers it has always seemed to me desirable to follow the more systematic introduction to the principles of method by means of syllabus, assigned readings, lectures, and discussions, with observations to provide illustrations. On the other hand, in classes consisting of *experienced* teachers who are preparing for supervision, it has seemed to me that the informal discussions based on observations are better. An essential point in this method is the systematic statement and organization of principles after they have been worked out in the discussions. This should include the gradual development of a syllabus of the main points by the teacher as the course progresses, and the independent preparation of a detailed syllabus by each member of the class. It usually happens that these syllabi contain nearly all the material that is found in the syllabus which is used in the systematic course, and, strange to say, the experienced teachers constituting the informal classes usually say that they would have preferred to have the course conducted in a formal, systematic way with the syllabus given to them at the beginning. In spite of this testimony I continue to believe that for experienced teachers who have had introductory courses in education the informal discussions based on observations and leading to well-organized principles are superior. The great objections to such courses are that they get nowhere in particular, leave matters in the air generally, and waste time in attempting to "discover" principles. These objections are avoided, however, by (1) definite direction and control by the instructor, (2) the progressive organization of syllabi, and (3) considerable assigned reading at points where it applies.

Printed scheme saves time but must be used intelligently. — In connection with the formal introductory course in the principles of method I have found it useful to print a list of points or questions to be used as a partial basis for reports upon lessons observed. This outline, which is printed below, may also be used in connection with observations and discussions with practice teachers. In order that the observation of the individual *pupils* constituting a practice group may be definitely provided for and organized, a list of questions for this purpose was prepared by Professor F. N. Freeman and is also printed below. The outlines may be used in a variety of ways and modified to suit local conditions. It is essential that the instructor make clear to students just how he expects the observations to be made and in just what way the outline for observation is to be used. As a routine device it saves time and energy, but it cannot take the place of intelligent adaptation and direction by the instructor.

In the case of observations in high school, prospective teachers are usually most interested in observing lessons in the special subjects which they are planning to teach. This often necessitates organizing observations by individuals or small groups instead of by the whole class. In the case of nearly all the old-established subjects, however, it is well for the prospective teacher to remember that in most high-school positions he may be called upon to teach any one of several subjects; hence he may observe to advantage along a number of lines.

SUGGESTIONS FOR ORGANIZING OBSERVATION OF TEACHING

The following outlines are printed in order to provide teachers and students with a definite starting point for the observation of children and of teaching.

OBSERVATION OF PUPILS

I. Physical differences. — 1. Age of pupil for his grade. 2. Size of pupil for his age. 3. Degree of physical maturity (change of voice, etc.) in comparison with others in class. 4. Weight, color of skin, manner (active or languid, etc.), as indications of nutrition and health. 5. Pronounced growth of abnormalities, as asymmetry of head, protruding teeth excessively large or small head, etc. 6. Posture sitting and standing and character of movements as indicating degree of neuromuscular control. 7. Sensory normality — visual and auditory. Evidence of nearsightedness or eyestrain from farsightedness or astigmatism. Evidence of inability to hear well — inattentiveness, slowness of response, or strain of attention. 8. Evidence of undue fatigue, nervousness, chorea, stuttering, or stammering.

II. Mental differences. — 1. Mental quickness. 2. Accuracy. 3. Sustained or flighty attention. 4. Degree of interest and enthusiasm. 5. Degree of initiative. 6. Unusual deficiency or ability in judgment and reasoning. 7. Mental energy.

III. Social and moral characteristics. — 1. Fairness and disposition to coöperate. 2. Aggressiveness or meekness. 3. Boldness or shyness. 4. Self-confidence or self-depreciation. 5. Temper. 6. Degree of thoroughness, carefulness, persistence shown in work. 7. Obedience. 8. Honesty and truthfulness.

OBSERVATION OF TEACHING

The following outline is based on the topics discussed in the preceding chapters. In answering the questions, students should not write simply *yes* or *no*, but should describe the situation in the light of the question under consideration. In some cases single questions may serve as the basis for prolonged discussion in the class. In writing a report based on certain paragraphs in the outline it is well to write to the general point of each paragraph and in such a way as to cover the detailed questions, but not to give a *separate* answer for each question or item in the paragraph. Such a report should contain concrete evidence for each point.

I. The physical situation. — Note the following aspects of the room: 1. Lighting. 2. Ventilation. 3. Temperature. 4. Seating. 5. Equipment and apparatus. 6. Cleanliness. 7. Decoration.

II. The routine factors in management. — Note the following from the standpoint of economy of time and energy: 1. Getting started. 2. Taking attendance and tardiness. 3. Handling materials, including use of monitors. 4. Necessity and means of discipline.

III. What the teacher was trying to accomplish, that is, the aim. — 1. What was it? 2. Was it appropriate or worth while? 3. Was it definite? clearly obvious to an observer? 4. Were the pupils clearly aware of it? 5. Was the lesson controlled by it? 6. Was it definitely achieved?

IV. The subject matter. — 1. What was it? 2. What was its social or applied value? 3. Did it center around a few definite large topics or principles or was it "scattering"? 4. Was there a clear appreciation by the teacher of the relative value of the various parts? 5. Was the subject as a whole organized logically in terms of itself, or psychologically in terms of the learner?

V. The type of learning involved in the lesson. — The following paragraphs (*A* to *F*) relate to special types of learning, any one of which may be predominant in a lesson that has been observed. That is, the lesson may have been organized primarily to develop motor skill, or to build up associations of ideas, or to solve problems, etc. For each type of learning special questions of method need to be considered, some of which are suggested in paragraphs *A* to *F*.

A. Motor learning. — If the process was primarily one of acquiring motor skill or motor control (for example, writing, manual training, gymnastics, vocal music, pronunciation of a foreign language): 1. Did the pupils have a clear idea of what they were to attempt? 2. Did the teacher depend on imitation or descriptive directions to give the idea? 3. Did he emphasize a special method or way of doing the thing? 4. Did he concentrate the pupils' attention on the form of the movement or on the objective results produced? 5. Did he give separate drill on the elementary movements or provide only for drill upon complex movements? 6. Did he tend to make the pupils self-critical or to have them depend upon him for criticism? Compare p. E 76 of *Exercises for "Methods of Teaching in High Schools."*

B. Modern foreign languages. — 1. What was the apparent aim, conversational or reading ability? 2. How many new meanings, idioms, usages, were introduced in the lesson? 3. What part did English symbols play in the teaching? 4. Did the teacher use any objects, models, sketches, charts, texts, or mimeographed series? If so, for what apparent purpose? 5. Did he demonstrate or dramatize any meaning? of verbs? adjectives? what? 6. Were any meanings conveyed by synonyms, opposites, contrast, paraphrasing? 7. Was it necessary at any time to resort to translation? 8. What evidence was there of careful planning in the conversational exercises? 9. What part did the pupils take in the work? 10. (*a*) Were phonetics used? (*b*) Were special phonetic symbols used? If so, specify and evaluate.

C. Drill. — If the teaching was primarily a process of fixing either motor or ideational connections that had already been started (for example, flash work in multiplication and in learning vocabularies, acquiring speed in writing): 1. Was the drill premature; that is, was it started before sufficient care had been taken to assure correct connections? 2. Did the students enter into it with zeal and concentration? 3. Was it concentrated upon the connections to be fixed or was time wasted on accessories? 4. Was it continued too long?

D. Reasoning. — If the process was primarily one of problem-solving or reasoning (for example, in mathematics, science, thought work in history and literature): 1. Did the pupils really solve the problems or did they reproduce some other person's solution? 2. Did the teacher succeed in assisting pupils to do their own reasoning instead of doing it for them? 3. Were they stimulated (*a*) to make a careful and thorough analysis of the whole situation? (*b*) to examine critically each suggestion or element, to determine its bearing on the question? (*c*) to keep the main problem clearly in mind and to check irrelevant thoughts and wanderings? (*d*) to arrange, compare, and organize their ideas? (*e*) to express tentative conclusions or summaries from time to time as a measure of the progress they had made? (*f*) to check and verify their tentative conclusions by seeing if they "worked" in other cases or by referring to standard authorities? 4. If the instruction was devoted primarily to the acquisition of certain abstract and general meanings: (*a*) Were familiar examples studied in sufficient detail to provide an adequate basis of real experience? (*b*) Were the students given sufficient opportunity to investigate, examine, and analyze? (*c*) Was the definition or generalization obtained through persistent generalizing and formulating by the students?

E. Enjoyment. — If the process was primarily one of acquiring habits of enjoyment (for example, in music, literature, contemplation of graphic and plastic art and natural scenery, participation in sports and games): 1. Was the enjoyment primarily of the contemplative or of the active and "participative" type? 2. Was it based on the relatively common, primitive reactions to rhythm, color, story, melody, etc. or on the rarer reactions to the technique of the artist or expert? 3. Did the students really "have a good time"? 4. Did the teacher tend to use the same method as would be used in studying "intellectual" lessons, as in geography, law, psychology, mathematics, etc.?

F. Expression. — If the process was primarily training in expression (for example, oral and written composition, dramatization, drawing): 1. Did it emphasize most the content side (that is, what the pupil had to communicate) or the form side (for example, linguistic forms)? 2. Was a real audience situation created, that is, the pupil with something to communicate and an audience to which it would be significant? 3. Was the content selected from the broader fields of human experience or from the narrower field of literary expression and other phases of artistic expression? 4. Was the emphasis placed on giving pupils command of expressional tools for everyday purposes or for artistic and technical purposes?

VI. Incentives, motives, interest, attention. — 1. Was there appreciation by the teacher of the economy in learning that comes from spontaneous interest on the part of the pupils? 2. If the pupils were inattentive, what was the explanation? 3. If interested, was the interest which was secured due to (*a*) the subject matter itself, (*b*) the teacher's personality, (*c*) tricks or devices in method (for example, sugar-coating)? 4. Upon what instincts did the attention depend (fear of physical pain, fear of social disapproval or desire for approval, emulation, curiosity, play, physical activity, manipulation, communication, coöperation)? 5. What interests were manifested which are especially characteristic of pupils of the age observed? 6. Were the children attentive because they had been taught the habit of being attentive as a duty?

VII. Provision for individual differences. — 1. What obvious evidence was there of differences in mental capacity? 2. Any evidence of fast pupils marking time or slow pupils being dragged along? 3. Any provision to vary the pace, intensity, or quality of the work to provide for individual differences — for example, (*a*) fast pupils excused from participating in the recitation and given special seat work; (*b*) special contributions by faster pupils; (*c*) class subdivided into groups proceeding at different rates or given different work; (*d*) special instruction for slow pupils?

VIII. Organization of the studying. — 1. Was care taken in making the assignment of the lesson to be studied? 2. Did it provide definite problems so that the pupils understood exactly what they were expected to do? 3. Any special attempt to arouse interest in the assigned work? 4. Any anticipation of difficulties by the teacher? 5. Any preliminary treatment by lecture or conversation? 6. Any supervised study? How much? How organized?

IX. Lecturing. — 1. Did the teacher contribute anything by lecturing? 2. How much? 3. Formal or informal? 4. Was it necessary? 5. Was it justified? 6. Did the pupils take notes?

X. Material from books. — 1. Were textbooks used? one or several? 2. What was the character of the recitation? (*a*) repetition of the text? (*b*) explanation of difficulties? (*c*) interpretation? (*d*) amplification or supplementing? (*e*) criticizing? 3. Were reference books used? (*a*) as a primary source of information? (*b*) for training in library work? 4. Was there an economical system of assignments for reference work (syllabus, mimeographed outlines, exact page references)? 5. Was there an economical system of getting at references (duplicate copies, reserve shelves, skilled attendants)? 6. Were notebooks on readings required and used so as to economize time of pupils and teachers? 7. Were bibliographies prepared by pupils? 8. (*a*) Did pupils make contributions from individual reading? (*b*) Were these so organized as to give training in continuous oral expression?

XI. Laboratory work. — 1. Was it primarily a process of discovery or a process of illustrating something already studied? 2. Did the interest center in the process of manipulation or in the scientific principle involved? 3. Did the pupils understand the principle involved? 4. (*a*) Was it demonstration work by the teacher or individual work by pupils? (*b*) Compare the economy in the former with the training secured in the latter, and decide which method would be better in the case observed. 5. (*a*) What sort of manual and notebooks were used? (*b*) Discuss their value.

XII. Conversational methods (sometimes vaguely called "development" methods). — The term refers here to lessons in which material is recalled from past experience through a process of mutual give and take by pupils and teacher. 1. Would a lecture or textbook or reference treatment of the topic have been better? 2. Why was the conversational treatment used? 3. Was it economical? 4. Did it sufficiently enrich the experience of the children? 5. Did it tend to wander from the topic?

XIII. Questioning. — 1. (*a*) Did the class exercise call for rapid-fire questioning or slow, thoughtful questioning? (*b*) Was the pace adapted to the thought movement required? 2. Did it seem that the teacher had carefully prepared the main central questions? 3. Did the questions elicit a thoughtful response from the members of the class? 4. Did all pupils feel responsible for every question? 5. Were the questions fairly distributed so that many pupils were called on? 6. Was the teacher skilled in tactful commendation or reproval which was adapted to each pupil's needs? 7. Did he make the recitation a place for group thought or did he waste time in pursuing or helping individuals?

XIV. Testing results. — 1. Was there evidence that the pupils were held strictly responsible for outside preparation? 2. Was the testing of their preparation set apart or mixed in with the other phases of the recitation? 3. Were students kept informed of how they were succeeding or failing? 4. Did the teacher simply test whether they had learned their lessons or did he test also their ability to interpret and apply?

Sample Directions for Five Reports

The following directions suggest the way in which an instructor may organize a specific number of observations based on the above outline.

I. General directions. — In addition to the specific directions for the several reports given below, each report should contain the following items: 1. (*a*) subject and topic observed, (*b*) place, (*c*) grade, (*d*) day and hour, (*e*) name of teacher. 2. Your general impressions of the skill shown by the teacher observed. 3. A brief comparison of the teaching observed with the way you were taught the same subject. 4. Any new helpful ideas of method which you derived from the observation.

II. Specific directions for the several reports. — In addition to the general directions noted above, follow the special directions for each report given below.

Report No. 1. Answer the questions in paragraphs I, II, and III on page 516 and in *one* of the paragraphs A, B, C, D, E, or F on pages 516–518.

Report No. 2. Answer the questions in *one* of the paragraphs A, B, C, D, E, or F on pages 516–518, and also answer the questions in paragraph VI on pages 518–519.

Report No. 3. Answer the questions in paragraph VII and also in *one* of the following paragraphs on pages 519–520 — VIII, X, XI, or XII.

Report No. 4. Give an account of the whole lesson arranged as a lesson plan according to the directions given on pages 484–487. For this purpose, be sure to see a lesson that contains considerable subject matter and questioning.

Also answer the questions in paragraph XIII on page 520.

Report No. 5. Follow the same directions as for report No. 4.

III. Order of reports. — These reports need not be submitted in the above order, although this order is usually advisable.

IV. Style of report. — In answering the questions in the paragraphs referred to, write to the general point of each paragraph and in such a way as to cover the detailed questions, but do not try to write a *separate* answer for each question or item in the paragraph. In other words, write a unified paragraph containing many points. Give concrete evidence for most points.

Use theme paper. Fold lengthwise and put your name and the number of the report on the outside.

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THE LAST WORD

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